

# MECHANICS

## SECTION H: LINKAGES/TRANSITIONS

This section of the GSI has been designed to provide an overview of linkages and transitions of CTS modules with a number of organizations. The charts and information presented in this section will assist CTS students and teachers in understanding the potential application of CTS modules as students move into the workplace.

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## LINKAGES/TRANSITIONS

There are many opportunities for students in Mechanics to build linkages among CTS strands and across other subject areas, including core and complementary programs. In addition to making linkages across the curriculum, making connections between what the students have already learned in other settings (e.g., home, community and workplace) can also be achieved through this strand.

### LINKAGES

#### With Basic Competencies

The Mechanics strand supports the development and integration of the basic competencies related to personal and resource management, problem solving, safe work practices and social interactions throughout the introductory, intermediate and advanced modules. It is important that students develop these competencies because success in the workplace often depends more on these skills than on many of the technical or academic skills they possess.

#### With Other CTS Strands

There are direct and indirect linkages with most strands, particularly where there is a need to understand how to use and maintain equipment/technology. The following chart represents linkages with other strands that may be of interest to Mechanics students.

Strand	Linkage
Agriculture	Landscape and Turf Management: maintenance and safety check on equipment Agriculture Technology: research applications of technology in agriculture production, processing or marketing
Career Transitions	Safety, job maintenance and workplace modules Use of project modules to enhance competencies related to Mechanics

Strand	Linkage
Community Health	First Aid certification
Communications	Study of equipment and maintenance required in the communication/printing industry
Construction Technologies	Tool and machine maintenance
Design Studies	Appropriate and effective design solutions, particularly as they apply to the Modes & Mechanisms module
Electro-Technologies	Knowledge and skills that apply to vehicle electrical and electronic systems
Enterprise and Innovation	Student can identify opportunities and develop future plans related to ventures in the mechanics field
Fabrication Studies	Welding/cutting/heating processes used in mechanics, particularly in autobody restoration Application of sheet metal fabrication principles Application of principles in brake work and engine rebuilding
Financial Management	Recognizing the need and developing skills in financial management necessary for successful business in Mechanics field
Foods	The maintenance and service skills required for food-processing and preparation equipment
Forestry	Career opportunities related to servicing of forestry equipment
Fashion Design	Knowledge and skills required for vehicle upholstery
Information Processing	Application of software, use of various information processing tools and processes
Tourism	Research land, air and sea transportation vehicles used in tourism and related career opportunities

It is important to note that the project, practicum and safety modules from the Career Transitions strand may be combined with modules from Mechanics strand to provide increased opportunities for students to develop expertise and refine their competencies in a particular area of study such as:

- acquiring safety skills and credentials
- completing vehicle repair work
- enhancing specific mechanical skills
- expanding a module topic or theme.

Examples of CTR Project modules that have been developed as extension to existing modules are provided in this section.

Linkages between Mechanics modules and other strands and across the curriculum have also been identified. Refer to “Mechanics: Connections With Other CTS Strands and Mechanics Connections Across the Curriculum” in this section.

In addition, modules may be aligned according to the course emphasis and themes that run between modules and strands as outlined in “Mechanics: Junior High School Module Clusters.”

For a summary of modules that can be combined with Mechanics from other strands, refer to “Mechanics: Extended Scope and Sequence.”

### **With Practical Arts Courses**

As of September 1997, modules in the Mechanics strand replace many existing practical arts junior and senior high programs. A detailed correlation of the Mechanics strand modules to the related practical arts courses can be found in this section (see “Mechanics: Correlations to Junior/Senior High school Practical Arts Courses”).

## **TRANSITIONS**

### **To The Community/Workplace**

Competencies developed in Mechanics provide students with many of the entry level skills for trades and occupations in the workplace (see “Mechanics: Potential Linkages with Alberta’s Apprenticeship Trades”).

Information from the National Occupational Classification (NOC) for which Mechanics provides a foundation is provided in this section (see “Mechanics: Related Occupations”). According to this chart, 12 occupations require high school education, and there are 23 trades related to Mechanics.

### **To Related Post-secondary Programs**

The themes and modules offered in Mechanics are consistent with many of the pre-employment and apprenticeship courses now being offered by post-secondary institutions.

A number of articulation agreements have been established with post-secondary institutions in Alberta. These agreements provide preferred entrance and/or advanced standing/credit for CTS students who have successfully completed designated modules. A current summary of articulation agreements in place that involve CTS modules is available through Alberta Education’s web site at <<http://ednet.edc.gov.ab.ca>>. For further information regarding particular articulation agreements, contact the post-secondary institution and/or review its respective calendar.

CTS courses in Mechanics may also link with one or more of Alberta’s Apprenticeship Training Programs; e.g., Automotive Service Technician, Auto Body Technician. Students who are employed as an apprentice in one of these trade areas and have successfully completed designated CTS modules may also qualify, upon the recommendation of their employer, for a portion of the in-school training component. A summary of articulation agreements established for specific

apprenticeship trades (including a correlation to CTS modules) is available through Alberta Education's web site. Further information regarding apprenticeship linkages can be obtained by contacting Alberta Advanced Education and Career Development, Apprenticeship and Industry Training Division.

An outline of post-secondary institutions in Alberta currently offering programs related to Mechanics can be found in this section (see "Mechanics: Summary of Related Post-secondary Programs").

## **CREDENTIALLING**

Students may earn partial or complete credentials recognized in the workplace and/or post-secondary institutions by demonstrating specified competencies within the CTS curriculum. The Mechanics strand, in conjunction with modules from the Career Transitions strand, provide opportunities for students to develop competencies related to:

- Emergency First Aid
- Power Engineering
- Transportation of Dangerous Goods.
- Workplace Hazardous Materials Information System

Further information regarding credentialling in Mechanics is provided in this section (see "Credentialling Opportunities in Mechanics") and the *Career & Technology Studies Manual for Administrators, Counsellors and Teachers* (Appendix 14).

**Mechanics: Sample CTR Project Modules**

**MODULE CTR2110: PROJECT 2A – BRAKE PROJECT**

<b>Level:</b>	Intermediate
<b>Theme:</b>	Career Extension
<b>Prerequisite:</b>	MEC2110 Braking Systems [Mechanics Strand]
<b>Module Description:</b>	Students, through projects, extend and enhance competencies developed in the Career Transitions strand or other Career and Technology Studies strands to contexts that are personally relevant.

**Module Parameters:** The student should have access to specialized brake tools/equipment and related resources.  
**Note:** Customer work must be supervised and checked by a certified technician.

Students will extend their competencies in braking systems in order to link with the first period Automotive Service Technician Apprenticeship Program.

**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"> <li>propose, manage and assess a project</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>a prepared project plan that includes:                             <ul style="list-style-type: none"> <li>purpose of the project</li> <li>expectations to be met</li> <li>resources, equipment and tools to be utilized</li> <li>project timelines.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>                      CTR Project: Career Extensions Modules</p> <p><i>Standard</i>                      Performance rating of 3 on each criteria</p>	10
	<ul style="list-style-type: none"> <li>meet goals as defined within the project plan</li> </ul> <ul style="list-style-type: none"> <li>completion of a report reflecting condition of:                             <ul style="list-style-type: none"> <li>brake fluid</li> <li>brake tubing/hoses</li> <li>master cylinder, wheel cylinders, calipers</li> <li>rotors, drums</li> <li>linings/pads</li> <li>brake hardware</li> <li>emergency brake components.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>                      Assessment Framework: Presentations/Reports, CTSPRE</p> <p><i>Standard</i>                      Performance rating of 2 on each criteria</p>	20

**Mechanics: Sample CTR Project Modules**

**MODULE CTR2110: PROJECT 2A – BRAKE PROJECT (continued)**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>• demonstrate basic competencies.</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• performance related to reconditioning/replacing:               <ul style="list-style-type: none"> <li>– tubing/hoses</li> <li>– master cylinder, wheel alignment, calipers</li> <li>– rotors, drums</li> <li>– linings/pads</li> <li>– brake hardware.</li> </ul> </li> </ul> <p><i>Assessment Tool</i> <i>Assessment Guide: Customer Service, MECCSP</i></p> <p><i>Standard</i> <i>Performance rating of 2 on each criteria</i></p> <ul style="list-style-type: none"> <li>• performance related to checks/adjustments of:               <ul style="list-style-type: none"> <li>– master cylinder</li> <li>– drum-lining clearances</li> <li>– park brakes</li> <li>– power brake</li> <li>– bleeding brakes.</li> </ul> </li> </ul> <p><i>Assessment Tool</i> <i>Assessment Guide: Customer Service, MECCSP</i></p> <p><i>Standard</i> <i>Performance rating of 2 on each criteria</i></p> <ul style="list-style-type: none"> <li>• observations of individual effort and interpersonal interaction during the learning process.</li> </ul> <p><i>Assessment Tool</i> <i>Basic Competencies Reference Guide and any assessment tools noted above</i></p>	<p>50</p> <p>20</p> <p>Integrated throughout</p>

*Mechanics: Sample CTR Project Modules*

**MODULE CTR2110: PROJECT 2A – BRAKE PROJECT** (continued)

Concept	Specific Learner Expectations	Notes
<p>Health and Safety Hazards</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• demonstrate knowledge of and follow safety procedures related to:               <ul style="list-style-type: none"> <li>– use of hones, brake lathe, brake tools</li> <li>– disassembling calipers, wheel cylinders, master cylinder</li> <li>– raising vehicles</li> <li>– brake fluid use.</li> </ul> </li> </ul>	<p>Be aware of the dangers associated with the use of compressed air.</p>
<p>Inspect/Service</p>	<ul style="list-style-type: none"> <li>• identify required service manuals and other resources for a given vehicle</li> <li>• identify deficiencies/services related to:               <ul style="list-style-type: none"> <li>– brake fluid</li> <li>– brake tubing/hoses</li> <li>– master cylinder, wheel cylinders, calipers</li> <li>– rotor, drums</li> <li>– brake linings, pads</li> <li>– brake hardware – springs, retainers, struts, adjuster assembly, splash shield, backing plate</li> <li>– emergency brake components</li> <li>– wheel bearings</li> </ul> </li> <li>• provide a report outlining work required to correct deficiencies</li> <li>• replace brake lines and hoses, observing proper routing and retaining clips/clamps if required</li> <li>• rebuild the following if required:               <ul style="list-style-type: none"> <li>– master cylinder</li> <li>– wheel cylinder</li> <li>– caliper</li> </ul> </li> <li>• replace brake linings and disc pads if worn</li> <li>• resurface brake drums and rotors if required</li> </ul>	<p>Recognize conditions that dictate replacement, e.g., clearance pitting, damaged bleeders screw.</p> <p><b>Note:</b> Turned drums and rotors must be within the stated tolerances.</p>

***Mechanics: Sample CTR Project Modules***

**MODULE CTR2110: PROJECT 2A – BRAKE PROJECT (continued)**

Concept	Specific Learner Expectations	Notes
Inspect/Service (continued)	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• assemble/install all brake components observing:               <ul style="list-style-type: none"> <li>– lubrication points</li> <li>– adjustments/checks related to:                   <ul style="list-style-type: none"> <li>• master cylinder</li> <li>• lining to drum clearances</li> <li>• emergency brake adjustment</li> </ul> </li> <li>– bleeding brake system</li> </ul> </li> <li>• after completed assembly:               <ul style="list-style-type: none"> <li>– check service and park brake operation</li> <li>– complete work order reflecting all parts, service performed and possible deficiencies that have been observed</li> <li>– prepare vehicle for customer pick-up.</li> </ul> </li> </ul>	<p>Procedure required when working the metering and proportioning valves.</p> <p>Brake or non-brake related.</p>

**Mechanics: Sample CTR Project Modules**

<b>MODULE CTR3110: PROJECT 3A – STANDARD TRANSMISSION PROJECT</b>	
<b>Level:</b>	Advanced
<b>Theme:</b>	Career Extensions
<b>Prerequisite:</b>	MEC2130 Power Trains [Mechanics Strand] MEC2140 Transmissions/Transaxles [Mechanics Strand] MEC3140 Drive Train Repair [Mechanics Strand]
<b>Module Description:</b>	Students, through projects, extend and enhance competencies developed in the Career Transitions strand or other Career and Technology Studies strands to contexts that are personally relevant.

**Module Parameters:** The student should have access to specialized transmission tools and related resources.

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

Students will extend their competencies in standard transmission repair in order to link with the first period Automotive Service Technician Apprenticeship Program.

**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"> <li>propose, manage and assess a project</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>a prepared project plan that includes:                             <ul style="list-style-type: none"> <li>purpose of the project</li> <li>expectations to be met</li> <li>resources and tools to be utilized</li> <li>project timelines.</li> </ul> </li> </ul> <p><i>Assessment Tool</i> <i>CTR Project: Career Extensions Modules</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
	<ul style="list-style-type: none"> <li>meet goals as defined within the project plan</li> </ul> <ul style="list-style-type: none"> <li>performance in disassembling a manual transmission, observing:                             <ul style="list-style-type: none"> <li>following prescribed procedure</li> <li>accuracy of checks performed</li> <li>correct diagnosis of faulty components.</li> </ul> </li> </ul> <p><i>Assessment Tool</i> <i>Assessment Guide: Customer Service, MECCSP</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	35

**Mechanics: Sample CTR Project Modules**

**MODULE CTR3110: PROJECT 3A – STANDARD TRANSMISSION PROJECT (continued)**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>• demonstrate basic competencies.</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• performance in reassembling a manual transmission, observing:               <ul style="list-style-type: none"> <li>– following prescribed procedure</li> <li>– measuring end play/clearance of gears and synchronizers</li> <li>– ability to shift assembled transmissions into all gear ranges.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Assessment Guide: Customer Service, MECCSP</i></p> <p><i>Standard</i>  <i>Performance rating of 3 on each criteria</i></p> <ul style="list-style-type: none"> <li>• observations of individual effort and interpersonal interaction during the learning process.</li> </ul> <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>Integrated throughout</p>

Concept	Specific Learner Expectations	Notes
<p>Health and Safety Hazards</p>	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• demonstrate knowledge of and follow safety procedures related to:               <ul style="list-style-type: none"> <li>– use of tools</li> <li>– fluid disposal</li> <li>– lifting transmissions.</li> </ul> </li> </ul>	<p>Be aware of potential strains owing to improper lifting techniques.</p>

**Mechanics: Sample CTR Project Modules**

**MODULE CTR3110: PROJECT 3A – STANDARD TRANSMISSION PROJECT (continued)**

Concept	Specific Learner Expectations	Notes
Inspect/Service	<p><i>The student should:</i></p> <ul style="list-style-type: none"><li>• identify the type of transmission using ID tag and manual on a given manual transmission:<ul style="list-style-type: none"><li>– follow repair manual procedures</li><li>– make clearance/end play checks</li><li>– disassemble according to instructions</li><li>– clean and inspect for worn/damaged components</li></ul></li><li>• provide a report outlining work required to restore transmission</li><li>• identify cause(s) that create manual transmission failures</li><li>• assemble manual transmission, replacing defective parts and establishing all end play and clearance measurements on assembled transmission:<ul style="list-style-type: none"><li>– check operation</li><li>– complete work order to reflect all parts/service performed</li><li>– list any related or unrelated deficiencies.</li></ul></li></ul>	

**Mechanics: Sample CTR Project Modules**

**MODULE CTR3120: PROJECT 3B – WHEEL ALIGNMENT PROJECT**

<b>Level:</b>	Advanced
<b>Theme:</b>	Career Extensions
<b>Prerequisite:</b>	MEC2150 Suspension System [Mechanics Strand] MEC2160 Steering System [Mechanics Strand] MEC3150 Wheel Alignment [Mechanics Strand]
<b>Module Description:</b>	Students, through projects, extend and enhance competencies developed in the Career Transitions strand or other Career and Technology Studies strands to contexts that are personally relevant.

**Module Parameters:** The student should have access to wheel alignment equipment/tools and related resources.

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

Students will extend their competencies in wheel alignment in order to link with the first period Automotive Service Technician Apprenticeship Program.

**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"> <li>propose, manage and assess a project</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>a prepared project plan that includes:               <ul style="list-style-type: none"> <li>purpose of the project</li> <li>expectations to be met</li> <li>resources and tools to be utilized</li> <li>project timelines.</li> </ul> </li> </ul> <p><i>Assessment Tool</i> <i>CTR Project: Career Extensions Modules</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	10
<ul style="list-style-type: none"> <li>meet goals as defined within the project plan</li> </ul>	<ul style="list-style-type: none"> <li>performance in determining steering/suspension deficiencies including:               <ul style="list-style-type: none"> <li>tires, wheels and wheel bearings</li> <li>loose, worn or bent parts</li> <li>suspension heights</li> <li>steering gear condition and adjustments.</li> </ul> </li> </ul> <p><i>Assessment Tool</i> <i>Assessment Guide: Customer Service, MECCSP</i></p> <p><i>Standard</i> <i>Performance rating of 3 on each criteria</i></p>	15

*Mechanics: Sample CTR Project Modules*

**MODULE CTR3120: PROJECT 3B – WHEEL ALIGNMENT PROJECT** (continued)

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>• performance in obtaining wheel alignment angles by observing:               <ul style="list-style-type: none"> <li>– readings within manufacturer’s specifications</li> <li>– readings to reflect desired steering characteristics, including overcoming road crown</li> <li>– centred steering wheel/gear.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Assessment Guide: Customer Service, MECCSP</i></p> <p><i>Standard</i>  <i>Performance rating of 3 on each criteria</i></p>	<p>25</p>
	<ul style="list-style-type: none"> <li>• performance in adjusting wheel alignment angles, observing:               <ul style="list-style-type: none"> <li>– readings within manufacturer’s specifications</li> <li>– readings to reflect desired steering characteristics, including overcoming road crown</li> <li>– centred steering wheel/gear.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Assessment Guide: Customer Service, MECCSP</i></p> <p><i>Standard</i>  <i>Performance rating of 3 on each criteria</i></p>	<p>35</p>
	<ul style="list-style-type: none"> <li>• performance in evaluating and correcting wheel alignment, including:               <ul style="list-style-type: none"> <li>– vehicle lead</li> <li>– steering wheel recovery (after turn)</li> <li>– centred steering wheel/gear</li> <li>– vibration</li> <li>– general handling.</li> </ul> </li> </ul> <p><i>Assessment Tool</i>  <i>Assessment Guide: Customer Service, MECCSP</i></p> <p><i>Standard</i>  <i>Performance rating of 3 on each criteria</i></p>	<p>15</p>

**Mechanics: Sample CTR Project Modules**

**MODULE CTR3120: PROJECT 3B – WHEEL ALIGNMENT PROJECT (continued)**

Module Learner Expectations	Assessment Criteria and Conditions	Suggested Emphasis
<p><i>The student will:</i></p> <ul style="list-style-type: none"> <li>demonstrate basic competencies.</li> </ul>	<p><i>Assessment of student achievement should be based on:</i></p> <ul style="list-style-type: none"> <li>observations of individual effort and interpersonal interaction during the learning process.</li> </ul> <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
Health and Safety Hazards	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>demonstrate knowledge of and follow safety procedures related to wheel alignment, including:               <ul style="list-style-type: none"> <li>safe use of alignment equipment</li> <li>issues related to unsafe vehicle owing to work related to alignment.</li> </ul> </li> </ul>	Fasteners correctly torqued, cotterpin use.
Project Definitions	<ul style="list-style-type: none"> <li>identify project including               <ul style="list-style-type: none"> <li>purpose of the project</li> <li>expectations to be met including customer concerns</li> <li>resources, equipment and tools to be utilized</li> <li>project timelines.</li> </ul> </li> </ul>	
Inspect/Service	<ul style="list-style-type: none"> <li>evaluate vehicle components including:               <ul style="list-style-type: none"> <li>tires, wheels and wheel bearings</li> <li>loose, worn or bent parts</li> <li>suspension height</li> <li>steering gear condition and adjustments.</li> </ul> </li> </ul>	

***Mechanics: Sample CTR Project Modules***

**MODULE CTR3120: PROJECT 3B – WHEEL ALIGNMENT PROJECT (continued)**

Concept	Specific Learner Expectations	Notes
	<p><i>The student should:</i></p> <ul style="list-style-type: none"> <li>• replace and/or adjust components prior to performing wheel alignment</li> <li>• identify and obtain the following alignment angles:               <ul style="list-style-type: none"> <li>– caster</li> <li>– camber</li> <li>– steering axes inclination</li> <li>– turning radius</li> <li>– toe-in, toe-out</li> </ul> </li> <li>• adjust alignment angles to reflect the following:               <ul style="list-style-type: none"> <li>– readings within manufacturer’s specifications</li> <li>– readings to reflect desired steering characteristics including overcoming road crown</li> <li>– centred steering wheel/gear</li> </ul> </li> <li>• evaluate completed alignment to confirm desired characteristics with respect to:               <ul style="list-style-type: none"> <li>– vehicle lead</li> <li>– steering wheel recovery</li> <li>– centred steering wheel/gear</li> <li>– vibration</li> <li>– general handling</li> </ul> </li> <li>• correct all noted deficiencies</li> <li>• prepare vehicle for delivery to customer including:               <ul style="list-style-type: none"> <li>– completion of work order</li> <li>– cleanliness of vehicle.</li> </ul> </li> </ul>	

# LINKAGES – Mechanics: Connections With Other CTS Strands

Mechanics Modules	Other CTS Strands																				
	Agriculture	Career Transitions	Communication Technology	Community Health	Construction Technologies	Cosmetology Studies	Design Studies	Energy and Mines	Electro-Technologies	Enterprise and Innovation	Fashion Studies	Financial Management	Foods	Fabrication Studies	Forestry	Legal Studies	Logistics	Information Processing	Management and Marketing	Tourism Studies	Wildlife
<b>Theme: Vehicle Design and Ownership</b>																					
MEC1010: Modes & Mechanisms																					
MEC1020: Vehicle Service & Care																					
MEC2010: Vehicle Detailing																					
MEC2020: Vehicle Maintenance																					
MEC3010: Buying & Selling Vehicles																					
MEC3020: Vehicle Value Appraisal																					
<b>Theme: Propulsion Systems</b>																					
MEC1040: Engine Fundamentals																					
MEC2030: Lubrication & Cooling																					
MEC2040: Fuel & Exhaust Systems																					
MEC2050: Alternate Fuel Engines																					
MEC2060: Ignition Systems																					
MEC2070: Emission Controls																					
MEC3030: Engine Diagnosis																					
MEC3040: Engine Tune-up																					
MEC3050: Engine Replacement																					
MEC3060: Engine Reconditioning 1																					
MEC3070: Engine Reconditioning 2																					
MEC3080: Alternate Energy Systems																					
<b>Theme: Guidance and Control Systems</b>																					
MEC1090: Electrical Fundamentals																					
MEC1110: Pneumatics & Hydraulics																					
MEC1130: Mechanical Systems																					
MEC2090: Electrical Components																					
MEC2100: Power Assist Accessories																					
MEC2110: Braking Systems																					
MEC2120: Hydraulic Accessories																					
MEC2130: Drive Trains																					
MEC2140: Transmissions/Transaxles																					
MEC3090: Computer Systems																					
MEC3100: Safety Systems																					
MEC3110: Climate Control																					
MEC3120: Power Assisting																					
MEC3130: Automatic Transmissions																					
MEC3140: Drive Train Repair																					
<b>Theme: Suspension and Structural Systems</b>																					
MEC1150: Ride & Control Systems																					
MEC1160: Structures & Materials																					
MEC1170: Metal Forming & Finishing																					
MEC1190: Surface Preparation 1																					
MEC2150: Suspension Systems																					
MEC2160: Steering Systems																					
MEC2170: Metal Repair & Finishing																					
MEC2180: Trim Replacement																					
MEC2190: Surface Preparation 2																					
MEC2200: Refinishing 1																					
MEC2210: Touch-up & Finishing																					
MEC2220: Interior Repairs																					
MEC3150: Wheel Alignment																					
MEC3160: Body Repair Estimation																					
MEC3170: Damage Analysis																					
MEC3180: Damage Repair 1																					
MEC3190: Damage Repair 2																					
MEC3200: Refinishing 2																					
MEC3210: Plastic & Fibreglass																					
MEC3220: Glass Replacement																					
MEC3230: Refinishing 3																					

Provides many direct links with competencies in this strand. Students will reinforce, extend and apply a substantial number of knowledge and/or skill components in practical situations.

Provides some links with competencies developed in this strand, usually through the application of related technologies and/or processes.



# LINKAGES – Mechanics: Connections Across the Curriculum

## Across the Curriculum

Mechanics Modules	Junior High							Senior High											
	Language Arts	Social Studies	Mathematics	Science	Health & PLS	Physical Education	Fine Arts	English	Social Studies	Mathematics	Science (General)	Biology	Chemistry	Physics	CALM	Physical Education	Fine Arts	Social Sciences	Second Language
<b>Theme: Vehicle Design and Ownership</b>																			
MEC1010: Modes & Mechanisms																			
MEC1020: Vehicle Service & Care																			
MEC2010: Vehicle Detailing																			
MEC2020: Vehicle Maintenance																			
MEC3010: Buying & Selling Vehicles																			
MEC3020: Vehicle Value Appraisal																			
<b>Theme: Propulsion Systems</b>																			
MEC1040: Engine Fundamentals																			
MEC2030: Lubrication & Cooling																			
MEC2040: Fuel & Exhaust Systems																			
MEC2050: Alternate Fuel Engines																			
MEC2060: Ignition Systems																			
MEC2070: Emission Controls																			
MEC3030: Engine Diagnosis																			
MEC3040: Engine Tune-up																			
MEC3050: Engine Replacement																			
MEC3060: Engine Reconditioning 1																			
MEC3070: Engine Reconditioning 2																			
MEC3080: Alternate Energy Systems																			
<b>Theme: Guidance and Control Systems</b>																			
MEC1090: Electrical Fundamentals																			
MEC1110: Pneumatics & Hydraulics																			
MEC1130: Mechanical Systems																			
MEC2090: Electrical Components																			
MEC2100: Power Assist Accessories																			
MEC2110: Braking Systems																			
MEC2120: Hydraulic Accessories																			
MEC2130: Drive Trains																			
MEC2140: Transmissions/Transaxles																			
MEC3090: Computer Systems																			
MEC3100: Safety Systems																			
MEC3110: Climate Control																			
MEC3120: Power Assisting																			
MEC3130: Automatic Transmissions																			
MEC3140: Drive Train Repair																			
<b>Theme: Suspension and Structural Systems</b>																			
MEC1150: Ride & Control Systems																			
MEC1160: Structures & Materials																			
MEC1170: Metal Forming & Finishing																			
MEC1190: Surface Preparation																			
MEC2150: Suspension Systems																			
MEC2160: Steering Systems																			
MEC2170: Metal Repair & Finishing																			
MEC2180: Trim Replacement																			
MEC2190: Surface Preparation 2																			
MEC2200: Refinishing 1																			
MEC2210: Touch-up & Finishing																			
MEC2220: Interior Repairs																			
MEC3150: Wheel Alignment																			
MEC3160: Body Repair Estimation																			
MEC3170: Damage Analysis																			
MEC3180: Damage Repair 1																			
MEC3190: Damage Repair 2																			
MEC3200: Refinishing 2																			
MEC3210: Plastic & Fibreglass																			
MEC3220: Glass Replacement																			
MEC3230: Refinishing 3																			

Provides many direct links with course content. Students will reinforce, extend and apply a substantial number of knowledge and/or skill components in practical contexts.

Provides some links with course content, usually through the application of related technologies and/or processes.



## LINKAGES – Mechanics: Junior High School Module Clusters

Course Emphasis	Mechanics Modules	Electro-Technologies Modules	Communication Technology Modules	Design Studies Modules
Vehicle Ownership (3 modules)	Modes & Mechanisms <i>MEC1010</i>	Electro-assembly 1 <i>ELT1010</i>		
	Vehicle Service & Care <i>MEC1020</i>			
Engine / Motors (4 modules)	Modes & Mechanisms <i>MEC1010</i>	Electro-assembly 1 <i>ELT1010</i>		
	Vehicle Service & Care <i>MEC1020</i>			
	Engine Fundamentals <i>MEC1040</i>			
Electricity / Electronics (5 modules)	Modes & Mechanisms <i>MEC1010</i>	Electro-assembly 1 <i>ELT1010</i>		Sketch, Draw & Model <i>DES1010</i>
	Electrical Fundamentals <i>MEC1090</i>			The Design Process <i>DES1020</i>
Energy Conversion / Uses (6 modules)	Modes & Mechanisms <i>MEC1010</i>	Electro-assembly 1 <i>ELT1010</i>	Media & You <i>COM1020</i>	Sketch, Draw & Model <i>DES1010</i>
				The Design Process <i>DES1020</i>

## Mechanics: Scope and Sequence

INTRODUCTORY	INTERMEDIATE	ADVANCED	THEME
Modes & Mechanisms <i>MEC1010</i>	Vehicle Detailing <i>MEC2010</i>	Buying & Selling Vehicles <i>MEC3010</i>	Vehicle Design and Ownership
Vehicle Service & Care <i>MEC1020</i>	Vehicle Maintenance <i>MEC2020</i>	Vehicle Value Appraisal <i>MEC3020</i>	
Engine Fundamentals <i>MEC1040</i>	Lubrication & Cooling <i>MEC2030</i>	Engine Diagnosis ♦ <i>MEC3030</i>	Propulsion Systems
	Fuel & Exhaust Systems <i>MEC2040</i>	Engine Tune-up <i>MEC3040</i>	
	Alternate Fuel Engines <i>MEC2050</i>	Engine Replacement ♦ <i>MEC3050</i>	
	Ignition Systems <i>MEC2060</i>	Engine Reconditioning 1 <i>MEC3060</i>	
	Emission Controls <i>MEC2070</i>	Engine Reconditioning 2 ♦ <i>MEC3070</i>	
		Alternate Energy Systems ♦ <i>MEC3080</i>	
Electrical Fundamentals <i>MEC1090</i>	Electrical Components <i>MEC2090</i>	Computer Systems ♦ <i>MEC3090</i>	Guidance and Control Systems
Pneumatics & Hydraulics <i>MEC1110</i>	Power Assist Accessories <i>MEC2100</i>	Safety Systems <i>MEC3100</i>	
	Braking Systems <i>MEC2110</i>	Climate Control ♦ <i>MEC3110</i>	
	Hydraulic Accessories <i>MEC2120</i>	Power Assisting <i>MEC3120</i>	
Mechanical Systems <i>MEC1130</i>	Drive Trains <i>MEC2130</i>	Automatic Transmissions ♦ <i>MEC3130</i>	
	Transmissions/Transaxles <i>MEC2140</i>	Drive Train Repair <i>MEC3140</i>	
Ride & Control Systems <i>MEC1150</i>	Suspension Systems <i>MEC2150</i>	Wheel Alignment <i>MEC3150</i>	Suspension and Structural Systems
Structures & Materials <i>MEC1160</i>	Steering Systems <i>MEC2160</i>	Body Repair Estimation ♦ <i>MEC3160</i>	
Metal Forming & Finishing <i>MEC1170</i>	Metal Repair & Finishing <i>MEC2170</i>	Damage Analysis <i>MEC3170</i>	
	Trim Replacement <i>MEC2180</i>	Damage Repair 1 ♦ <i>MEC3180</i>	
Surface Preparation 1 <i>MEC1190</i>	Surface Preparation 2 <i>MEC2190</i>	Damage Repair 2 <i>MEC3190</i>	
	Refinishing 1 <i>MEC2200</i>	Refinishing 2 <i>MEC3200</i>	
	Touch-up & Finishing <i>MEC2210</i>	Plastic & Fibreglass ♦ <i>MEC3210</i>	
	Interior Repairs ♦ <i>MEC2220</i>	Glass Replacement ♦ <i>MEC3220</i>	
		Refinishing 3 ♦ <i>MEC3230</i>	

— Prerequisite

- - - Recommended sequence

♦ Refer to specific modules for additional prerequisites.

**Mechanics: Extended Scope and Sequence**

<b>THEME</b>	<b>INTRODUCTORY</b>	<b>INTERMEDIATE</b>	<b>ADVANCED</b>
Vehicle Design and Ownership	You & the Law 1 <i>LGS1010</i>	Electrical Servicing <i>ELT2020</i>	Materials Testing <i>FAB3010</i>
	Consumer Products & Services <i>ENM1060</i>		
Propulsion Systems	Nonrenewable Resources <i>ENM1020</i>	Renewable Energy Technology <i>ENM2050</i>	
	Principles of Machining <i>FAB1130</i>	Precision Turning 1 <i>FAB2130</i>	Precision Turning 2 <i>FAB3130</i>
	Quality Customer Service <i>MAM1020</i>		
Guidance and Control Systems	Digital Technology 1 <i>ELT1060</i>	Digital Technology 2 <i>ELT2060</i>	Digital Technology 3 <i>ELT3060</i>
		Computer Technology <i>ELT2070</i>	Microprocessors <i>ELT3080</i>
	Control Systems 1 <i>ELT1080</i>	Control Systems 2 <i>ELT2080</i>	Microprocessor Interface <i>ELT3090</i>
Suspension and Structural Systems	Oxy-acetylene Welding <i>FAB1040</i>	Oxy-fuel Welding <i>FAB2030</i>	
	Basic Electric Welding <i>FAB1050</i>	Arc Welding 1 <i>FAB2050</i>	
	Sheet Fabrication 1 <i>FAB1090</i>	Arc Welding 2 <i>FAB2060</i>	Arc Welding 3 <i>FAB3050</i>
	Fabrication Principles <i>FAB1100</i>	Sheet Fabrication 2 <i>FAB2090</i>	Managing the Venture <i>EAI3010</i>
		Sheet Fabrication 3 <i>FAB2100</i>	Production Planning <i>CON3190</i>
		Upholstery <i>FAS2150</i>	Production Management <i>CON3200</i>

—— Prerequisite

----- Recommended sequence

Refer to specific modules for additional prerequisites and recommended sequence.



# LINKAGES – Mechanics: Potential Linkages With Alberta Apprenticeship Trades

	Trade	CTS Strands											Enhancement Modules				
		Agriculture	Communication Technology	Construction Technology	Cosmetology	Design Studies	Electro-Technologies	Energy & Mines	Fabrication Studies	Fashion Studies	Foods	Management & Marketing	Mechanics	Career Transitions	Enterprise & Innovation	Work Experience	
<b>High Degree of Alignment With Apprenticable Trades</b>	Agricultural Mechanic																
	Autobody Mechanic																
	Baker																
	Cabinetmaker																
	Carpenter																
	Communication Electrician																
	Cook																
	Electrician																
	Electronic Technician																
	Hairstylist																
	Heavy Duty Mechanic																
	Landscape Gardener																
	Machinist																
	Motorcycle Mechanic																
	Motor Mechanic																
	Printing & Graphic Arts Craftsman																
	Sheet Metal Worker																
	Tool & Die Maker																
	Welder																
	<b>Partial Alignment With Apprenticeship Trades</b>	Appliance Serviceman															
Boilermaker																	
Bricklayer																	
Cement Finisher																	
Crane & Hoisting Equipment Operator																	
Electrical Rewind Mechanic																	
Elevator Constructor																	
Floorcovering Installer																	
Gasfitter																	
Glassworker																	
Instrument Mechanic																	
Insulator																	
Ironworker																	
Lather-Interior System Mechanic																	
Millwright																	
Painter & Decorator																	
Partsman																	
Plasterer																	
Plumber																	
Power Lineman																	
Power System Electrician																	
Projectionist																	
Recreation Vehicle Mechanic																	
Refrigeration & Air Conditioning Mechanic																	
Roofer																	
Sawfiler																	
Circular Sawfiler																	
Sprinkler Systems Installer																	
Steamfitter-Pipefitter																	
Structural Steel and Plate Fitter																	
Tilesetter																	
Transport Refrigeration Mechanic																	
Water Well Driller																	

CTS Strands that deliver many of the competencies/program defined in the first period of the apprenticeship program  
 CTS Strands that deliver some of the competencies/program defined in the first period of the apprenticeship program



## TRANSITIONS – *Mechanics: Related Occupations*

Information for this chart was obtained from the National Occupational Classification (NOC) descriptions.

### Educational Requirements:

D: High School Education

B: College or Vocational Education

C: Apprenticeship

A: University

Occupational Profile	NOC#	D	C	B	A
Agriculture Mechanics/Farm Equipment Mechanics	7216		✓	✓	
Aircraft Maintenance Engineer	7315	✓		✓	
Appliance Serviceman	7332		✓	✓	
Assemblers, Fabricators and Inspectors, Industrial Electrical Motors and Transformers	9485	✓		✓	
Auto Body Mechanic	7322		✓	✓	
Automotive Mechanical Installers and Servicers	7321	✓			
Carman	7314	✓			
Construction Millwrights and Industrial Mechanics (except Textile)	7311		✓	✓	
Contractors and Supervisors, Mechanic Trades	7216		✓	✓	
Electronic Assemblers, Fabricators, Inspectors and Testers	9483	✓			
Elevator Constructors and Mechanics	7318		✓	✓	
Heavy Duty Equipment Mechanics	7312		✓	✓	
Industrial Instrument Technicians and Mechanics	2243		✓	✓	
Machine Fitter	7316		✓	✓	
Machine Operators and Inspectors, Electrical Apparatus Manufacturing	9487	✓			
Machinists and Machining and Tooling Inspectors	7231		✓	✓	
Maintenance Manager	0722			✓	✓
Manufacturing Manager	0911			✓	✓
Mechanical Assemblers and Inspectors	2244	✓			
Mechanical Engineer	2132				✓
Mechanical Engineering Technologist	2232			✓	
Motor Mechanic	7321		✓		
Motorcycle Mechanic	7334		✓		
Motor Vehicle Body Repairer	7322		✓	✓	
Motor Vehicle Mechanics, Technicians and Mechanical Repairers	7322		✓	✓	
Oil and Solid Fuel Heating Mechanics	7331		✓	✓	
Other Small Engine and Equipment Mechanics	7335		✓	✓	
Other Trades and Related Occupations	7383		✓	✓	
Other Trades Helpers and Labourers	7612	✓			

**TRANSITIONS – Mechanics: Related Occupations (continued)**

<b>Occupational Profile</b>	<b>NOC#</b>	<b>D</b>	<b>C</b>	<b>B</b>	<b>A</b>
Partsman	1472		✓	✓	
Power Engineer	7351				✓
Refrigeration and Air Conditioning Mechanics	7313		✓	✓	
Recreation Vehicle Mechanic	7383		✓	✓	
Storekeepers and Parts Clerks	1472	✓		✓	
Supervisors, Machinists and Related Occupations	7211		✓	✓	
Supervisors, Motor Vehicle Assembling	9221	✓			
Supervisors, Other Mechanical and Metal Products Manufacturing	7211	✓			
Textile Machinery Mechanics and Repairers	7317	✓			
Tool and Die Makers	7232		✓	✓	
Transportation Refrigeration Mechanic	7313		✓	✓	

**TRANSITIONS – Mechanics: Summary of Post-secondary Programs**

	PUBLIC COLLEGES										APPRENTICESHIP TRADE	PRIVATE COLLEGES					TECH. INST.	Banff	UNIVERSITIES				VOCATIONAL COLLEGES						
	Alberta College of Art & Design	Fairview College	Grande Prairie Regional College	Grant MacEwan Community College	Keyano College	Lakeland College	Lethbridge Community College	Medicine Hat College	Mount Royal College	Olds College		Red Deer College	Alberta College	Augustana University College	Canadian Union College	Concordia College	King's University College, The	North American Baptist College	Northern Alberta Institute of Technology	Southern Alberta Institute of Technology	Banff Centre	Athabasca University	University of Alberta	University of Calgary	University of Lethbridge	AVC - Calgary	AVC - Edmonton	AVC - Lac La Biche	AVC - Lesser Slave Lake
Aeronautical/Mechanical Engineering Technology																			CD (3y)										
Aircraft Maintenance Engineering/Engineers Technology																		V	VD										
Aviation/Avionics Technology							D	D		D								C	D										
Computer Maintenance/Repair																		CD	V										
Mechanical Engineering Technologies							D											D	D										
Other Construction-related Apprenticeship Trades (including Lather-Interior Systems Mechanic)											3y																		
Other Electrical Trades (including Instrument Mechanic)											4y								28w										
Agricultural Mechanic						C(16 w)				D	2y																		
Appliance Serviceman											3y																		
Auto Body Technician											3y																		
Heavy Equipment Technicians (including Diesel Mechanics, Industrial Heavy Equipment Technician/Technology, Journeyman updating & Pre-employment)		VC			8w	C(16 w)	C			30w	4y							CD	C										
Machinist											4y							C											
Marine Service Technician		C																											

**CODES:** B Bachelor's Degree      D Diploma (2 years)      w weeks  
M Master's Degree      V Varies      m months  
Ph.D. Doctoral Degree      1t One-year transfer      y years  
C Certificate (1 year or less)      2t Two-year transfer



## **CREDENTIALLING – Mechanics: Credentialling Opportunities★**

The following credentialling opportunities link with modules in Mechanics and other strands.

<b>Certificate</b>	<b>Agency</b>	<b>Linking Modules</b>	<b>Instructor Qualifications</b>	<b>Comments</b>
Emergency First Aid	St. John Ambulance Canadian Red Cross	Personal Safety (Management) (CTR1210)	Certified First Aid/CPR Instructor	Three-year nationally recognized certificate
Power Engineering Technology	Power Engineering Department, SAIT	Practicum Modules (CTR Practicum Modules A-E (CTR3040–3080)	Certified instructor from industry	A modular and computer-enhanced learning program available through the SAIT Open Learning Instruction Systems (SOLIS) that links with Third Class Power Engineering
Workplace Hazardous Materials Information Systems (WHMIS)	Occupational Health and Safety	Personal Safety (Management) (CTR1210)	WHMIS Instructor	Addresses skills required to work safely with hazardous materials
Transportation of Dangerous Goods (TDG)	Transportation and Utilities	Workplace Safety (Practices) (CTR2210)	TDG Instructor	Addresses skills required by individuals involved with the transportation and handling of dangerous goods

★ Further information regarding these and other credentialling opportunities available to CTS students is available through Alberta Education’s web site <<http://ednet.edc.gov.ab.ca>>.