



## COURSE OUTLINE: TCT715 - VEH MANAGEMENT ELEC

Prepared: Sylvain Belanger

Approved: Corey Meunier, Chair, Technology and Skilled Trades

<b>Course Code: Title</b>	TCT715: VEHICLE MNGT ELECTRONICS/EMISSIONS SYST
<b>Program Number: Name</b>	6081: T/C TECHN LEVEL II
<b>Department:</b>	MOTIVE POWER APPRENTICESHIP
<b>Semesters/Terms:</b>	19S
<b>Course Description:</b>	Upon successful completion the apprentice is able to use generic and proprietary ESTs and PCs to read, troubleshoot and reprogram vehicle electronic systems, is able to understand the basics of a vehicle computer control system and how it functions to process information and produce outcomes, and is able to understand the principles of operation, diagnose and repair electronic input circuit components.
<b>Total Credits:</b>	2
<b>Hours/Week:</b>	2
<b>Total Hours:</b>	16
<b>Prerequisites:</b>	There are no pre-requisites for this course.
<b>Corequisites:</b>	There are no co-requisites for this course.
<b>Essential Employability Skills (EES) addressed in this course:</b>	<div>EES 2 Respond to written, spoken, or visual messages in a manner that ensures effective communication.</div> <div>EES 3 Execute mathematical operations accurately.</div> <div>EES 4 Apply a systematic approach to solve problems.</div> <div>EES 5 Use a variety of thinking skills to anticipate and solve problems.</div> <div>EES 6 Locate, select, organize, and document information using appropriate technology and information systems.</div> <div>EES 7 Analyze, evaluate, and apply relevant information from a variety of sources.</div> <div>EES 10 Manage the use of time and other resources to complete projects.</div>
<b>General Education Themes:</b>	Science and Technology
<b>Course Evaluation:</b>	Passing Grade: 50%, D
<b>Other Course Evaluation &amp; Assessment Requirements:</b>	<div>Theory testing 70%</div> <div>Practical application testing 30%</div> <div>Grade</div> <div>Definition Grade Point Equivalent</div> <div>A+ 90 - 100% 4.00</div> <div>A 80 - 89%</div> <div>B 70 - 79% 3.00</div> <div>C 60 - 69% 2.00</div> <div>D 50 - 59% 1.00</div> <div>F (Fail) 49% and below 0.00</div> <div>CR (Credit) Credit for diploma requirements has been awarded.</div>



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	<p>S Satisfactory achievement in field /clinical placement or non-graded subject area.</p> <p>U Unsatisfactory achievement in field/clinical placement or non-graded subject area.</p> <p>X A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.</p> <p>NR Grade not reported to Registrar's office.</p> <p>W Student has withdrawn from the course without academic penalty.</p>				
<b>Books and Required Resources:</b>	<p>Medium/heavy duty truck engines,fuels and computerized management systems by Sean Bennett</p> <p>Publisher: Cengage Edition: 5</p>				
<b>Course Outcomes and Learning Objectives:</b>	<table> <tr> <th>Course Outcome 1</th><th>Learning Objectives for Course Outcome 1</th></tr> <tr> <td>Upon successful completion, the apprentice is able to use generic and proprietary ESTs and PCs to read, troubleshoot and reprogram vehicle electronic systems.</td><td> <p>Upon successful completion, the apprentice is able to:</p> <p>5.1.1 Explain the purpose and fundamentals of electronic service tools (ESTs).</p> <p>[1/0] - digital multimeters (DMMs)</p> <ul style="list-style-type: none"> <li>- generic ESTs</li> <li>- proprietary ESTs</li> <li>- personal computers (PCs)</li> <li>- online service information systems</li> <li>- diagnostic software</li> <li>- breakout Ts &amp; boxes</li> <li>- labscopes</li> </ul> <p>5.1.2 Identify the functions, construction and application of ESTs and manufacturer software.</p> <p>[1/0]</p> <ul style="list-style-type: none"> <li>- digital multimeters (DMMs)</li> <li>- generic reader / programmers</li> <li>- proprietary reader / programmers</li> <li>- personal computers (PCs)</li> <li>- breakout Ts &amp; boxes</li> <li>- scope meter</li> </ul> <p>5.1.3 Describe the principle(s) of operation of ESTs</p> <p>[1/0]</p> <ul style="list-style-type: none"> <li>- digital multimeters</li> <li>- accuracy</li> <li>- resolution</li> <li>- display interpretation</li> <li>- voltage, amperage, continuity and resistance measurements</li> <li>- scope meter</li> <li>- generic reader / programmers</li> <li>- software cartridges</li> <li>- upgrading PROM</li> <li>- proprietary reader / programmers</li> <li>- upgrading software</li> <li>- personal computers</li> <li>- communications adapters</li> <li>- SAE communications protocols</li> <li>- data retention media</li> <li>- connections</li> </ul> <p>5.1.4 Perform readout, diagnostic and networking tasks using</p> </td></tr> </table>	Course Outcome 1	Learning Objectives for Course Outcome 1	Upon successful completion, the apprentice is able to use generic and proprietary ESTs and PCs to read, troubleshoot and reprogram vehicle electronic systems.	<p>Upon successful completion, the apprentice is able to:</p> <p>5.1.1 Explain the purpose and fundamentals of electronic service tools (ESTs).</p> <p>[1/0] - digital multimeters (DMMs)</p> <ul style="list-style-type: none"> <li>- generic ESTs</li> <li>- proprietary ESTs</li> <li>- personal computers (PCs)</li> <li>- online service information systems</li> <li>- diagnostic software</li> <li>- breakout Ts &amp; boxes</li> <li>- labscopes</li> </ul> <p>5.1.2 Identify the functions, construction and application of ESTs and manufacturer software.</p> <p>[1/0]</p> <ul style="list-style-type: none"> <li>- digital multimeters (DMMs)</li> <li>- generic reader / programmers</li> <li>- proprietary reader / programmers</li> <li>- personal computers (PCs)</li> <li>- breakout Ts &amp; boxes</li> <li>- scope meter</li> </ul> <p>5.1.3 Describe the principle(s) of operation of ESTs</p> <p>[1/0]</p> <ul style="list-style-type: none"> <li>- digital multimeters</li> <li>- accuracy</li> <li>- resolution</li> <li>- display interpretation</li> <li>- voltage, amperage, continuity and resistance measurements</li> <li>- scope meter</li> <li>- generic reader / programmers</li> <li>- software cartridges</li> <li>- upgrading PROM</li> <li>- proprietary reader / programmers</li> <li>- upgrading software</li> <li>- personal computers</li> <li>- communications adapters</li> <li>- SAE communications protocols</li> <li>- data retention media</li> <li>- connections</li> </ul> <p>5.1.4 Perform readout, diagnostic and networking tasks using</p>
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		<p>ESTs and shop PC units including:</p> <p>[0/2]</p> <ul style="list-style-type: none"> <li>- select and use ESTs to troubleshoot live and simulated circuit conditions</li> <li>- internet familiarization</li> <li>- saving data</li> <li>- identify hard and soft EST malfunctions</li> <li>- distinguish between electrical and software performance problems on malfunctioning ESTs</li> <li>- outline procedures for updating ESTs</li> </ul>
	<b>Course Outcome 2</b>	<b>Learning Objectives for Course Outcome 2</b>
	<p>Upon successful completion, the apprentice is able to understand the basics of a vehicle computer control system and how it functions to process information and produce outcomes</p>	<p>Upon successful completion, the apprentice is able to:</p> <p>5.2.1 Explain the purpose and fundamentals of onboard computers, input devices and output actuators.</p> <p>[1/0]</p> <ul style="list-style-type: none"> <li>- analog / digital computers</li> <li>- binary systems</li> <li>- digital computers</li> <li>- logic gates</li> <li>- data links</li> <li>- networking</li> <li>- fiber optics</li> </ul> <p>5.2.2 Identify the functions, construction and application of vehicle computers.</p> <p>[1/0]</p> <ul style="list-style-type: none"> <li>- input sensors</li> <li>- central processing unit (CPU)</li> <li>- main memory (RAM)</li> <li>- non-volatile data retention</li> <li>- ROM</li> <li>- PROM</li> <li>- EEPROM</li> <li>- output actuators</li> </ul> <p>5.2.3 Describe the principle(s) of operation of vehicle computers.</p> <p>[2/0]</p> <ul style="list-style-type: none"> <li>- analog to digital converters</li> <li>- signal filtration</li> <li>- Central Processing Unit (CPU)</li> <li>- processing cycle</li> <li>- baud rate (Clock speed)</li> <li>- logic sequencing</li> <li>- main memory (RAM)</li> <li>- non-volatile data retention</li> <li>- ROM</li> <li>- PROM</li> <li>- EEPROM</li> <li>- ECM integral outputs</li> </ul>
	<b>Course Outcome 3</b>	<b>Learning Objectives for Course Outcome 3</b>

	<p>Upon successful completion, the apprentice is able to understand the principles of operation diagnose and repair electronic input circuit components.</p>	<p>Upon successful completion, the apprentice is able to:</p> <p>5.3.1 Explain the purpose and fundamentals of electronic input circuit components. [1/0]</p> <ul style="list-style-type: none"> <li>- electronics</li> <li>- computer basics</li> <li>- electronic schematic interpretation</li> </ul> <p>5.3.2 Identify the function, construction and application of electronic input circuit components. [1/0]</p> <ul style="list-style-type: none"> <li>- reference voltage</li> <li>- thermistor</li> <li>- potentiometers</li> <li>- variable capacitance sensors</li> <li>- pulse wheel generators</li> <li>- rotary hall-effect sensors</li> <li>- linear hall-effect sensors</li> <li>- electromechanical switches</li> <li>- smart (ladder) switches</li> <li>- semiconductors</li> <li>- optical sensors</li> <li>- gasoline exhaust gas sensors</li> <li>- piezoelectric</li> <li>- piezoresistive</li> <li>- wheatstone bridges</li> <li>- pressure differential (Delta) sensors</li> </ul> <p>5.3.2 Describe the principle(s) of operation of electronic input circuit components. [3/0]</p> <ul style="list-style-type: none"> <li>- reference voltage</li> <li>- thermistor</li> <li>- potentiometers</li> <li>- variable capacitance sensors</li> <li>- pulse wheel generators</li> <li>- hall-effect sensors</li> <li>- optical sensors</li> <li>- gasoline exhaust gas sensors</li> <li>- switches</li> <li>- piezoelectric</li> <li>- piezoresistive</li> <li>- wheatstone bridges</li> </ul> <p>5.3.4 Perform inspection, testing and diagnostic procedures on electronic input circuit components. [0/1]</p> <ul style="list-style-type: none"> <li>- test functional and malfunctioning input circuit components</li> <li>- diagnose performance conditions produced malfunctioning input circuit components</li> </ul> <p>5.3.5 Recommend reconditioning or repairs following manufacturers' procedures on electronic</p>
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	input circuit components. [0/1] - outline procedure for replacing defective input circuit components - performance test replaced input circuit components		
<b>Evaluation Process and Grading System:</b>	<b>Evaluation Type</b>	<b>Evaluation Weight</b>	<b>Course Outcome Assessed</b>
	practical application testing	30%	
	theory testing	70%	
<b>Date:</b>	April 1, 2019		
	Please refer to the course outline addendum on the Learning Management System for further information.		