



**Transportation Technology III:  
Intermediate Auto Maintenance and Servicing  
Second Semester**

**Course Information**

<b>Grade(s):</b>	10-12
<b>Discipline/Course:</b>	Technology Education
<b>Course Title:</b>	Transportation Technology III: Intermediate Auto Maintenance and Servicing, Semester II
<b>Prerequisite(s):</b>	Transportation Technology II: Basic Automotive Maintenance and Repair with teacher permission <i>or</i> Technology III: Intermediate Auto Maintenance and Servicing, Semester I <i>or</i> Teacher's Permission
<b>Course Description:</b> <i>Program of Studies</i>	Students will continue the study of auto maintenance and servicing, with a deeper exploration of basic auto maintenance and servicing practices. Students will build on their previous knowledge of basic automobile maintenance and servicing through exploration of more complex systems of the automobile. Hands-on experience in the automotive lab as well as theory of operation will be employed. Additional elements of the course will include the investigation of other forms of transportation and transportation systems.
<b>Course Essential Questions:</b>	<ul style="list-style-type: none"> <li>● Why is knowledge of how electricity functions essential in modern auto repair?</li> <li>● How does knowledge from other content areas (Math, Science, the Arts), help us solve problems?</li> <li>● How do the components that make up suspension and steering systems impact vehicle performance?</li> <li>● How is engine performance managed by the fuel and emissions systems on a modern automobile?</li> <li>● How do electrical inputs and outputs impact vehicle function?</li> <li>● What type of front, top and rear end design will benefit the aerodynamics of the vehicle?</li> <li>● How does vehicle design factor into its efficiencies and performance?</li> </ul>
<b>Course Enduring Understandings:</b>	<ul style="list-style-type: none"> <li>● Transportation systems use electrical energy to work.</li> <li>● Technology and engineering are fundamental human activities requiring a range of skills.</li> <li>● Technology and engineering are interdisciplinary, requiring the application of knowledge</li> </ul>

	and skills related to science, math, and the arts <ul style="list-style-type: none"> <li>• Transportation systems use energy sources to work.</li> </ul>
<b>Duration/Credit:</b>	Semester / 0.5 credit
<b>Course Materials/ Resources:</b>	Textbook, Equipment and Consumables.
<b>FPS Course Academic Expectation(s):</b>	EU - Exploring and Understanding CC - Creating and Constructing
<b>Semester at a Glance (Units)</b>	Unit 1 - Ignition Systems & Computer Systems (4 weeks) Unit 2 - Charging Systems & Starting Systems (2 weeks) Unit 3 - Fuel and Emissions Systems (3 weeks) Unit 4 -Steering and Suspension Systems (3 weeks) Unit 5 - Hybrid and EV Systems Exploration (4 weeks) Unit 6 -Engineering Design Experience (4 weeks)

<b>Unit Number and Title:</b>	Unit 1: Ignition Systems & Computer Systems.
<b>Duration:</b>	4 weeks.
<b>Resource(s):</b>	Textbook, Equipment & Consumables.
<b>Unit Overview:</b>	Students will develop an understanding of ignition systems and computer systems in a vehicle. Construction of basic electricity and electronic circuitry will be explored.
<b>Learning Goals</b>	
<b>Standard(s):</b>	AUTO.06 Demonstrate the function, principles, and operation of electrical and electronic systems using manufacturer and industry standards. AUTO.06.01 Maintain, diagnose, and repair electrical systems. AUTO.07 Engine Performance: Describe the components and functions of the various systems that are related to engine performance. AUTO.07.01 Describe the purpose, operation, and basic components of the ignition system. AUTO.07.04 Explain the use of a computer scanner to read Diagnostic Trouble Codes.
<b>Essential Question(s):</b>	<ul style="list-style-type: none"> <li>• Why is knowledge of how electricity functions essential in modern auto repair?</li> <li>• How does knowledge from other content areas (math, science, the arts), help us solve problems?</li> </ul>
<b>Enduring Understanding(s):</b>	<ul style="list-style-type: none"> <li>• Transportation systems use electrical energy to work.</li> <li>• Technology and engineering are fundamental human activities requiring a range of skills.</li> <li>• Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.</li> </ul>
<b>Learning Goal(s):</b> <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)	<b>Content:</b> (Students will know...) <ul style="list-style-type: none"> <li>• operating principles of an automotive ignition system.</li> <li>• the function of major ignition system components.</li> </ul>

- the computer uses of sensor inputs to determine correct outputs.
- the components of electronics, ignition systems and computers to efficiently control an automobile.

**Skills:** (Students will be able to...)

- identify and describe the function of an automotive ignition system's components.
- use a scan tool to detect abnormal operating conditions.
- maintain, diagnose, and repair electrical systems.
- measure electrical voltage, resistance and amperage in auto components and systems.

<b>Unit Number and Title:</b>	Unit 2: Charging & Starting Systems.
<b>Duration:</b>	2 weeks.
<b>Resource(s):</b>	Equipment & Consumables.
<b>Unit Overview:</b>	Students will develop an understanding of charging and starting systems in a vehicle. Construction of basic electricity and electronic circuitry will be explored.
<b>Learning Goals</b>	
<b>Standard(s):</b>	AUTO.06 Demonstrate the function, principles, and operation of electrical and electronic systems using manufacturer and industry standards. AUTO.06.01 Maintain, diagnose, and repair electrical systems. AUTO.06.03 Describe the purpose, operation, and components of basic starting systems. AUTO.06.04 Describe the purpose, operation, and components of basic charging systems.
<b>Essential Question(s):</b>	<ul style="list-style-type: none"> <li>• Why is knowledge of how electricity functions essential in modern auto repair?</li> <li>• How does knowledge from other content areas (Math, Science, the Arts), help us solve problems?</li> </ul>
<b>Enduring Understanding(s):</b>	<ul style="list-style-type: none"> <li>• Transportation systems use electrical energy to work.</li> <li>• Technology and engineering are fundamental human activities requiring a range of skills.</li> <li>• Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.</li> </ul>
<b>Learning Goal(s):</b> <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)	<b>Content:</b> (Students will know...) <ul style="list-style-type: none"> <li>• the purpose, operation, and components of basic starting systems.</li> <li>• the purpose, operation, and components of basic charging systems.</li> </ul> <b>Skills:</b> (Students will be able to...) <ul style="list-style-type: none"> <li>• compare voltage, current and resistance in charging and starting system components.</li> </ul>

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|  | <ul style="list-style-type: none"><li>● diagnose common problems in charging and starting system components.</li><li>● replace system components on a vehicle.</li><li>● apply electrical and mechanical troubleshooting methods to determine problems.</li></ul> |
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### Unit 3

<b>Unit Number and Title:</b>	Unit 3: Fuel and Emission Controls.
<b>Duration:</b>	3 weeks.
<b>Resource(s):</b>	Equipment & Consumables.
<b>Unit Overview:</b>	Students will develop an understanding of fuel systems and emission control systems in a vehicle. Construction of basic electricity and electronic circuitry will be explored.
<b>Learning Goals</b>	
<b>Standard(s):</b>	<p>Auto.07 Engine Performance: Describe the components and functions of the various systems that are related to engine performance.</p> <p>AUTO.07.02 Describe the purpose, operation, and basic components of fuel and air induction systems.</p> <p>AUTO.07.03 Describe the purpose, operation, and basic components of exhaust and exhaust emissions system.</p> <p>AUTO.07.04 Explain the use of a computer scanner to read Diagnostic Trouble Codes.</p> <p>AUTO.07.05 Identify the differences between carburetion and fuel injection.</p> <p>AUTO.07.06 Describe the purpose, operation, and basic components of evaporative emission control systems.</p>
<b>Essential Question(s):</b>	<ul style="list-style-type: none"> <li>● How is engine performance managed by the fuel and emissions systems in a modern automobile?</li> <li>● How does knowledge from other content areas (math, science, the arts), help us solve problems?</li> </ul>
<b>Enduring Understanding(s):</b>	<ul style="list-style-type: none"> <li>● Technology and engineering are fundamental human activities requiring a range of skills.</li> <li>● Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.</li> </ul>



**Learning Goal(s):**

*Students will know and will be able to use their learning to:*

(Content/ Skills)

**Content:** (Students will know...)

- the purpose, operation, and basic components of fuel systems.
- the purpose, operation, and basic components exhaust emissions system.
- explain the use of a computer scanner to read diagnostic trouble codes.
- the purpose, operation, and basic components of evaporative emission control systems.

**Skills:** (Students will be able to...)

- identify the differences between carburation and fuel injection.
- describe how a fuel system functions.
- evaluate the condition and operation of a fuel system.
- describe how an emission system functions.
- evaluate the condition and operation of an emission system.
- use a computer scanner to read diagnostic trouble codes.

<b>Unit Number and Title:</b>	Unit 4: Suspension and Steering.
<b>Duration:</b>	3 weeks.
<b>Resource(s):</b>	Equipment & Consumables..
<b>Unit Overview:</b>	Students will focus on identifying and understanding components that make up suspension and steering systems and their functions on modern automobiles .
<b>Learning Goals</b>	
<b>Standard(s):</b>	AUTO.08 Suspension and Steering: Identify and describe the function of the components that make up suspension and steering systems. AUTO.08.01 Describe the purpose, operation, and basic components of the steering system. AUTO.08.02 Describe the purpose, operation, and basic components of the suspension system. AUTO.08.03 Explain caster, camber, and toe-in wheel alignment angles. AUTO.08.04 Identify factors that cause abnormal tire wear.
<b>Essential Question(s):</b>	<ul style="list-style-type: none"> <li>• How do the components that make up suspension and steering systems impact vehicle performance?</li> <li>• How does knowledge from other content areas (Math, Science, the Arts), help us solve problems?</li> </ul>
<b>Enduring Understanding(s):</b>	<ul style="list-style-type: none"> <li>• Technology and engineering are fundamental human activities requiring a range of skills</li> <li>• Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.</li> </ul>
<b>Learning Goal(s):</b> <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)	<b>Content:</b> (Students will know...) <ul style="list-style-type: none"> <li>• the purpose, operation, and basic components of the steering system.</li> <li>• the purpose, operation, and basic components of the suspension system.</li> </ul> <b>Skills:</b> (Students will be able to...) 

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|  | <ul style="list-style-type: none"><li>● explain caster, camber, and toe-in wheel alignment angles.</li><li>● identify factors that cause abnormal tire wear.</li><li>● evaluate the condition of suspension and steering components.</li><li>● perform repairs of worn components.</li></ul> |
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<b>Unit Number and Title:</b>	Unit 5: Hybrid and EV Systems Exploration.
<b>Duration:</b>	4 weeks.
<b>Resource(s):</b>	Textbook, Equipment & Consumables.
<b>Unit Overview:</b>	In this unit students will be exploring typical hybrid and EV drive systems. The exploration of hybrid and EV systems will include the major assemblies: batteries, motors, motor-generators, internal combustion engines, control systems, charging systems and cooling systems.
<b>Learning Goals</b>	
<b>Standard(s):</b>	AUTO.06 Demonstrate the function, principles, and operation of electrical and electronic systems using manufacturer and industry standards. AUTO.06.01 Maintain, diagnose, and repair electrical systems. AUTO.06.02 Explain the process for performing battery diagnosis and service.
<b>Essential Question(s):</b>	<ul style="list-style-type: none"> <li>• How is engine performance managed by the fuel and emissions systems on a modern automobile?</li> <li>• How does knowledge from other content areas (Math, Science, the Arts), help us solve problems?</li> </ul>
<b>Enduring Understanding(s):</b>	<ul style="list-style-type: none"> <li>• Technology and engineering are fundamental human activities requiring a range of skills.</li> <li>• Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.</li> </ul>
<b>Learning Goal(s):</b> <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)	<p><b>Content:</b> (Students will know...)</p> <ul style="list-style-type: none"> <li>• types of hybrid drive systems: full hybrid, series hybrid, parallel hybrid, series-parallel hybrid.</li> <li>• components of typical hybrid systems.</li> <li>• components of typical EV drive systems.</li> </ul> <p><b>Skills:</b> (Students will be able to...)</p>

- describe the differences between hybrid and EV systems.
- describe how different systems apply torque to the vehicle's drive train.
- describe how series-parallel hybrid systems can recharge the HV battery.
- evaluate the advantages of various hybrid and EV systems.

<b>Unit Number and Title:</b>	Unit 6: Engineering Design Experience.
<b>Duration:</b>	4 weeks.
<b>Resource(s):</b>	Equipment & Consumables.
<b>Unit Overview:</b>	Using design-based learning approaches students will design, build and evaluate a fixed path or variable path transportation system. Exploration of various systems including electrical, aerodynamics and other vehicle design factors will be evaluated.
<b>Learning Goals</b>	
<b>Standard(s):</b>	<p>ITEEA (International Technology and Engineering Educators Association) Standards for Technological and Engineering Literacy (STEL).</p> <p>STEL-2M. Differentiate between inputs, processes, outputs, and feedback in technological systems.</p> <p>STEL-3G. Explain how knowledge gained from other content areas affects the development of technological products and systems.</p> <p>STEL-7N. Practice successful design skills.</p> <p>STEL-7O. Apply tools, techniques and materials in a safe manner as part of the design process.</p> <p>STEL-7Q. Apply the technology and engineering design process.</p> <p>STEL-7V. Improve essential skills necessary to successfully design.</p> <p>TRAN.02 Define transportation technology systems.</p> <p>TRAN.02.04 Design, build and evaluate a simple fixed path or variable path transportation system.</p> <p>TRAN.02.07 Identify, design and apply and the uses of different energy and power technologies.</p> <p>TRAN.02.08 Use design-based learning approaches that intentionally integrate the content and process of science and/or mathematics education with the content and process of technology and/or engineering education.</p>
<b>Essential Question(s):</b>	<ul style="list-style-type: none"> <li>● How does knowledge from other content areas (math, science, the arts), help us solve problems?</li> <li>● How do electrical inputs and outputs impact vehicle function?</li> </ul>

	<ul style="list-style-type: none"> <li>• What type of front, top and rear end design will benefit the aerodynamics of the vehicle?</li> <li>• How does vehicle design factor into its efficiencies and performance?</li> </ul>
<b>Enduring Understanding(s):</b>	<ul style="list-style-type: none"> <li>• Transportation systems use energy sources to work.</li> <li>• Technology and engineering are fundamental human activities requiring a range of skills.</li> <li>• Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.</li> </ul>
<b>Learning Goal(s):</b> <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)	<p><b>Content:</b> (Students will know...)</p> <ul style="list-style-type: none"> <li>• the benefits of understanding aerodynamics related to vehicle design.</li> <li>• design factors influencing vehicle performance.</li> <li>• the impact of vehicle weight on efficiency.</li> </ul> <p><b>Skills:</b> (Students will be able to...)</p> <ul style="list-style-type: none"> <li>• design, build, a vehicle to meet design parameters.</li> <li>• create a scale drawing of the vehicle to be built.</li> <li>• design a vehicle considering aerodynamics and weight and friction factors.</li> <li>• test a vehicle design to evaluate design criteria.</li> </ul>