



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

Course Information

Grade(s):	10-12
Discipline/Course:	Technology Education
Course Title:	Transportation Technology III: Intermediate Auto Maintenance and Servicing, Semester I
Prerequisite(s):	Transportation Technology II: Basic Automotive Maintenance and Repair <i>or</i> Teacher's Permission
Course Description: <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.
Course Essential Questions:	<ul style="list-style-type: none"> ● How can I demonstrate the value and necessity of practicing personal and occupational safety and protecting the environment by using materials and processes in accordance with manufacturer and industry standards? ● What is the impact of the internal combustion engine on our society? ● Why is it important to understand relationships between systems which function together? ● How does knowledge from other content areas (Math, Science, the Arts), help us solve problems? ● What problem solving steps should be used to diagnose a condition. ● How can we choose the best tools to use for a particular task or to solve a problem? ● How does knowledge from other content areas (Math, Science, the Arts), help us solve problems? ● Why is knowledge of how electricity functions essential in modern auto repair? ● How does knowledge from other content areas (math, science, the arts), help us solve problems?
Course Enduring Understandings:	<ul style="list-style-type: none"> ● Technology and engineering are fundamental human activities requiring a range of skills ● Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts. ● Safety is a lifestyle which impacts our entire environment.

	<ul style="list-style-type: none"> • Technology and engineering are fundamental human activities requiring a range of skills. • Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts. • Mechanical skills and technological problem-solving can be rewarding to diagnose and repair automotive systems and related technologies. • Transportation systems use electrical energy to work. • Technology and engineering are fundamental human activities requiring a range of skills. • Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.
Duration/Credit:	Semester / 0.5 credit
Course Materials/Resources:	Textbook, Equipment and Consumables.
FPS Course Academic Expectation(s):	EU - Exploring and Understanding CC - Creating and Constructing
Semester at a Glance (Units)	Unit 1: Safety in the Automobile Repair Facility (2 Weeks) Unit 2: Engine Fundamentals and Design (2-3 weeks) Unit 3: On Board Diagnostics and Troubleshooting (3-4 weeks) Unit 4: Brake Servicing, Anti-Lock Brakes, Traction and Stability Control (6-7 weeks) Unit 5: Basic Electricity/Electronics (5-6 weeks)

Unit Number and Title:	Unit 1: Safety in the Automobile Repair Facility.
Duration:	2 Weeks.
Resource(s):	Textbook, Equipment & Consumables.
Unit Overview:	Students will learn how to actively incorporate safety while working in a mechanics shop/lab and practice general shop safety practices.
Learning Goals	
Standard(s):	<p>AUTO.01 Students demonstrate the value and necessity of practicing personal and occupational safety and protecting the environment by using materials and processes in accordance with manufacturer and industry standards.</p> <p>AUTO.01.04 Describe a safe working environment for both employees and the shop environment.</p> <p>AUTO.01.05 Demonstrate and explain knowledge of personal safety practices such as eyewear, clothing, footwear, and personal protective equipment (PPE).</p> <p>AUTO.01.06 Demonstrate and explain knowledge of shop safety procedures when performing tasks, such as raising a vehicle with a floor jack.</p> <p>AUTO.01.07 Identify basic hand tools and their usage in the automotive industry.</p> <p>AUTO.03.05 Describe principles of pneumatic and hydraulic power and their applications.</p>
Essential Question(s):	<ul style="list-style-type: none"> • How can I demonstrate the value and necessity of practicing personal and occupational safety and protecting the environment by using materials and processes in accordance with manufacturer and industry standards?
Enduring Understanding(s):	<ul style="list-style-type: none"> • Technology and engineering are fundamental human activities requiring a range of skills • Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts. • Safety is a lifestyle which impacts our entire environment.

<p>Learning Goal(s): <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)</p>	<p>Content: (Students will know...)</p> <ul style="list-style-type: none"> ● safety rules and procedures for the transportation/auto shop. ● application of selected tools and machines for working on automobiles. <p>Skills: (Students will be able to...)</p> <ul style="list-style-type: none"> ● demonstrate proper tool use. ● demonstrate proper safety skills. ● use common automotive repair tools properly. ● demonstrate how to use several of the common measuring tools used in auto diagnoses and repair with proper techniques.
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Unit Number and Title:	Unit 2: Engine Fundamentals and Design.
Duration:	2-3 weeks.
Resource(s):	Textbook, Equipment & Consumables.
Unit Overview:	Students will gain an understanding of common engine design configurations, components and operation fundamentals.
Learning Goals	
Standard(s):	<p>AUTO.03 Explain scientific principles in relation to chemical, mechanical, and physical functions for various engine and vehicle systems.</p> <p>AUTO.03.01 Demonstrate the operating principles of internal and external combustion engines.</p> <p>AUTO.03.02 Describe basic valve train operation and configuration, such as DOHC, SOHC, OHV, and flathead.</p> <p>AUTO.03.03 Describe basic engine cylinder configurations such as V, inline, and horizontally opposed.</p> <p>AUTO.03.04 Identify and describe the function of the basic engine components.</p>
Essential Question(s):	<ul style="list-style-type: none"> • What is the impact of the internal combustion engine on our society?
Enduring Understanding(s):	<ul style="list-style-type: none"> • Technology and engineering are fundamental human activities requiring a range of skills. • Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.
Learning Goal(s): <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)	<p>Content: (Students will know...)</p> <ul style="list-style-type: none"> • operating principles of internal and external combustion engines. • basic engine parts and their function. • basic function of the major parts of an automotive engine. <p>Skills: (Students will be able to...)</p>

- describe different engine design classifications.
- identify the major parts of a typical automotive engine.
- describe the four stroke cycle.
- identify different types of engine design.

Unit Number and Title:	Unit 3: On Board Diagnostics and Troubleshooting.
Duration:	3-4 weeks.
Resource(s):	Textbook, Equipment & Consumables.
Unit Overview:	Students will be able to understand the purpose and operation of on-board diagnostic systems and the use of scan tools to diagnose commonly found diagnostic trouble codes on today's autos. Students will use the scan tool to scan for problems in the engine and its support systems, the emission system, the transmission, the suspension system, the anti-lock brake system, and other vehicle systems.
Learning Goals	
Standard(s):	AUTO.07 Engine Performance: Describe the components and functions of the various systems that are related to engine performance. AUTO.07.04 Explain the use of a computer scanner to read Diagnostic Trouble Codes (DTC).
Essential Question(s):	<ul style="list-style-type: none"> ● Why is it important to understand relationships between systems which function together? ● How does knowledge from other content areas (Math, Science, the Arts), help us solve problems?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Technology and engineering are fundamental human activities requiring a range of skills. ● Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.
Learning Goal(s): <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)	Content: (Students will know...) <ul style="list-style-type: none"> ● modern automotive computer systems, their functions and how they are designed to detect problems and indicate where issues might be located. ● operation of electrical-electronic parts in major vehicle systems. ● principles of scan tools to detect operating conditions of major automobile systems.

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

- discuss the purpose and operation of on-board diagnostic systems.
- explain the use of scan tools to simplify reading of trouble codes.
- locate the data link connector on most makes and models of cars.
- activate on-board diagnostics and read trouble codes with a scan tool.
- erase diagnostic trouble codes.
- scan for problems in the engine and its support systems.
- use a scan tool to monitor the operation of electrical and electronic components.

Unit Number and Title:	Unit 4: Brake Servicing, Anti-Lock Brakes, Traction and Stability Control.
Duration:	6-7 weeks.
Resource(s):	Equipment & Consumables.
Unit Overview:	Students will be able to diagnose common brake system problems, inspect and maintain a brake system, and explain how to service disc and drum brake assemblies.
Learning Goals	
Standard(s):	AUTO.09 Demonstrate function and principles of automotive drivetrain, steering and suspension, brake, and tire and wheel components and systems in accordance with portable national industry standards. ENG.09.01 Identify what causes resistance in a fluid system. ENG.09.02 Describe the following components and applications of fluid power principles: reservoir, fluid conductors, valves, pumps, actuators, Pascal’s Law, and Bernoulli’s Principle. ENG.09.03 Describe components of hydraulic and pneumatic systems. ENG.09.04 Describe work in electrical, mechanical, fluid and thermal systems. ENG.09.05 Explain rate in electrical, mechanical, fluid and thermal systems. ENG.09.06 Describe resistance in electrical, mechanical, fluid and thermal systems.
Essential Question(s):	<ul style="list-style-type: none"> • What problem solving steps should be used to diagnose a condition. • How can we choose the best tools to use for a particular task or to solve a problem? • How does knowledge from other content areas (Math, Science, the Arts), help us solve problems?
Enduring Understanding(s):	<ul style="list-style-type: none"> • Mechanical skills and technological problem-solving can be rewarding to diagnose and repair automotive systems and related technologies.
Learning Goal(s): <i>Students will know and will be</i>	Content: (Students will know...)

<p><i>able to use their learning to:</i> (Content/ Skills)</p>	<ul style="list-style-type: none"> ● brake system components and how they operate. ● the major functions of a brake system. ● anti-lock brakes, traction control, and stability control help in controlling a modern vehicle. ● the hydraulic and mechanical principles of a brake system. <p>Skills: (Students will be able to...)</p> <ul style="list-style-type: none"> ● diagnose and repair a vehicle's brake system. ● explain how to service disc and drum brake systems. ● describe procedures for bleeding a brake system. ● identify the major parts of an automotive brake system. ● identify the major parts of a typical anti-lock brake system. ● describe the operation of anti-lock brake systems. ● inspect and maintain a brake system. ● compare disc and drum brakes. ● describe the purpose and operation of traction control and stability control systems.
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Unit Number and Title:	Unit 5: Basic Electricity/Electronics
Duration:	5-6 weeks.
Resource(s):	Equipment & Consumables.
Unit Overview:	Students will develop an understanding as to how electricity and electronics function in a vehicle. Construction of basic electricity and electronic circuitry will be explored.
Learning Goals	
Standard(s):	<p>AUTO.06 Demonstrate the function, principles, and operation of electrical and electronic systems using manufacturer and industry standards.</p> <p>AUTO.06.06 Differentiate between series and parallel circuits.</p> <p>AUTO.06.07 Define volts, amperes, and resistance.</p> <p>AUTO.06.08 Perform simple calculations for volts, amperes, and resistance using Ohm's Law.</p> <p>ENG.08 Demonstrate the application of science and math principles to the electrical engineering process.</p> <p>ENG.08.02 Describe and apply the following electricity principles: Ohm's, Watt's, series, parallel, combination circuits, AC/DC systems, and conductors/insulators</p> <p>ENG.08.03 Use appropriate electrical units to solve problems.</p> <p>ENG.08.04 Draw a circuit diagram and lay out the circuit.</p> <p>ENG.08.05 Describe work in electrical systems.</p> <p>ENG.08.06 Explain rate in electrical systems.</p> <p>ENG.08.07 Describe resistance in electrical systems.</p>
Essential Question(s):	<ul style="list-style-type: none"> ● Why is knowledge of how electricity functions essential in modern auto repair? ● How does knowledge from other content areas (math, science, the arts), help us solve problems?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Transportation systems use electrical energy to work. ● Technology and engineering are fundamental human activities requiring a range of skills.

	<ul style="list-style-type: none"> ● Technology and engineering are interdisciplinary, requiring the application of knowledge and skills related to science, math, and the arts.
<p>Learning Goal(s): <i>Students will know and will be able to use their learning to:</i> (Content/ Skills)</p>	<p>Content: Students will know...</p> <ul style="list-style-type: none"> ● how electricity functions in basic electrical and electronic components in a vehicle. ● the process of building simple electronic components for specific applications. <p>Skills: (Students will be able to...)</p> <ul style="list-style-type: none"> ● identify basic electricity and electronic terms and components. ● build a simple electronic circuit board. ● compare voltage, current and resistance. ● explain the principles of electricity. ● describe the action of basic electric circuits and devices. ● describe the principles of magnetism and magnetic fields. ● apply electrical troubleshooting methods to determine circuit problems.