

Course Title – Automotive Technology

Implement start year – 2017-2018

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Unit #4 - Electrical and Fuel systems

Transfer Goal –

Students will be able to independently integrate and apply essential technical skills to identify, diagnose, maintain and repair electrical and fuel systems.

Stage 1 – Desired Results

Established Goals

2009 NJCCC Standard(s), Strand(s)/CPI #
(<http://www.nj.gov/education/cccs/2009/final.htm>)

Common Core Curriculum Standards for Math and English
(<http://www.corestandards.org/>)

8.2 Technology Education, Engineering, and Design

All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment.

G. The Designed World: The designed world is the product of a design process that provides the means to convert resources into products and systems.

- 8.2.12.G.1 Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.

21st Century Themes

(www.21stcenturyskills.org)

- Global Awareness
- Financial, Economic, Business and Entrepreneurial Literacy
- Civic Literacy
- Health Literacy
- Environmental Literacy

21st Century Skills

Learning and Innovation Skills:

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Communication and Collaboration

Information, Media and Technology Skills:

- Information Literacy
- Media Literacy
- ICT (Information, Communications and

<p>CCSS.ELA-LITERACY.RST.9-10.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.</p> <p>CCSS.ELA-LITERACY.WHST.9-10.2.F Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).</p> <p>9.1 21st-Century Life & Career Skills All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.</p> <p>9.1.12.A.1 Apply critical thinking and problem-solving strategies during structured learning experiences.</p>	<p>Technology) Literacy</p> <p><i>Life and Career Skills:</i> <input checked="" type="checkbox"/> Flexibility and Adaptability <input checked="" type="checkbox"/> Initiative and Self-Direction <input checked="" type="checkbox"/> Social and Cross-Cultural Skills <input checked="" type="checkbox"/> Productivity and Accountability <input checked="" type="checkbox"/> Leadership and Responsibility</p>
<p><u>Enduring Understandings:</u> <i>Students will understand that . . .</i></p> <p><i>EU 1</i> today's vehicles rely on electronic systems as much as mechanical systems.</p> <p><i>EU 2</i> fuel systems must meter a precise amount of fuel into the engine under a wide range of constantly changing operating conditions.</p>	<p><u>Essential Questions:</u></p> <p><i>EU 1</i></p> <ul style="list-style-type: none"> • What purpose does electricity have in operating a vehicle? • What happens when the Engine Control Unit (ECU) fails while driving? • What are the mechanical limits of a computer system in a vehicle? • How is a computer system in a vehicle similar or different from a human body's nervous system? <p><i>EU 2</i></p> <ul style="list-style-type: none"> • How do high performance systems affect fuel systems? • How has the Environmental Protection Agency had an impact on the automotive industry? • How has the federal government controlled the automotive market?

Knowledge:

Students will know . . .

EU 1

- the principles of electricity.
- simple, series, parallel, and series-parallel circuits.
- how an electrical system operates independently and how it's integrated with other systems.
- the operating principles of a battery.
- the fundamentals of the starting, ignition, and charging system.
- the circuitry involved in a vehicle.

EU 2

- how standard and alternative fuel systems operate.
- the purpose of octane and cetane ratings.
- the various types of fuel injection systems.
- how fuel burns inside an engine.
- how combustion is a primary factor controlling fuel economy, power, emissions, and engine life.
- carburetor design differences.

Skills:

Students will be able to . . .

EU 1

- explain how a computer uses sensor inputs to determine correct outputs.
- wire and solder simple, series, parallel, and series-parallel circuits.
- service and maintain a vehicle battery.
- diagnose common starting system troubles.
- diagnose charging system troubles.
- perform common tests used to find ignition system troubles.
- troubleshoot problems in light, wiper, horn, and sound systems.
- discuss safety procedures to follow when working on electrical systems.

EU 2

- service a fuel supply system.
- locate and replace fuel filters.
- discuss safety procedures to follow when working on fuel systems.
- service and maintain a throttle body.
- Perform an Onboard Diagnostic (OBD) test on a late model fuel injection system.
- service carburetor systems.

Stage 2 – Assessment Evidence

Other Recommended Evidence:

- Quiz/Test
- Worksheets

- Workbooks
- Discussions
- Videos
- Software

Stage 3 – Learning Plan

Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: *Each learning activity listed must be accompanied by a learning goal of A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.*

- Teacher led discussions on electrical and fuel systems. (A)
- Use ProDemand software (M,T)
- Workbook on electrical system unit such as chapters 8, 17, 18, 19, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, in Modern Automotive Technology Book (A)
- Workbook on fuel system unit such as chapters 20, 21, 22, 23, 24, and 25 in Modern Automotive Technology Book (A)
- Student led discussion and demonstration of basic electrical tests (A, M)
- Discuss simple, series, parallel, and series-parallel circuits. (A)
- Practice soldering (M,T)
- Teacher demonstration of a battery service including charging a battery. (A)
- Teacher demonstration of spark plug change (A)
- Teacher demonstration of diagnosing and replace a malfunctioning starter (A)
- Teacher demonstration on alternator output (A)
- Teacher demonstration on changing lighting units (A)
- Teacher demonstration of specialized electrical system tools (A)
- Videos on battery recycling, how a battery is made, how a charging system works, how to rebuild an alternator which can be found on youtube.com (A)
- Discuss environmental impact of recycling of hazardous materials (A, M)
- Discuss fuels such as gasoline, diesel, and alternative sources (A)
- Teacher demonstration of fuel filter change (A)
- Teacher demonstration of fuel pump replacement (M, T)
- Discussion of fuel injection and carburation (A)
- Teacher demonstration of servicing a carburetion system (M)
- Videos on fuel injection and carburetors (A)