## Course Title – Automotive Technology

## Implement start year – 2017-2018

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## Unit #2 - Internal Combustion Engine

## Transfer Goal –

Students will be able to independently use their learning to communicate and collaborate using appropriate technical terms to describe, analyze, interpret, and judge their work and the work of others to diagnose mechanical problems when an engine malfunctions.

## Stage 1 – Desired Results

| **Established Goals** | **21st Century Themes ( www.21stcenturyskills.org )** |
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| **2009 NJCCC Standard(s), Strand(s)/CPI #** (http://www.nj.gov/education/cccs/2009/final.htm)<br>**Common Core Curriculum Standards for Math and English** (http://www.corestandards.org/)<br><br>8.2 Technology Education, Engineering, and Design | ___ Global Awareness<br>___Financial, Economic, Business and Entrepreneurial Literacy<br>___Civic Literacy<br>___Health Literacy<br>___Environmental Literacy |

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| 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.<br><br>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.<br>• 8.2.12.G.1 Analyze the interactions among various technologies and collaborate to create a product or system demonstrating their interactivity.<br><br>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.<br><br>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).<br><br>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.<br><br>9.1.12.A.1<br>Apply critical thinking and problem-solving strategies during structured learning experiences. | **21st Century Skills**<br><br>Learning and Innovation Skills:<br>_x__Creativity and Innovation<br>_x__Critical Thinking and Problem Solving<br>_x__Communication and Collaboration<br><br>Information, Media and Technology Skills:<br>_x__Information Literacy<br>_x__Media Literacy<br>_x__ICT (Information, Communications and Technology) Literacy<br><br>Life and Career Skills:<br>_x__Flexibility and Adaptability<br>_x__Initiative and Self-Direction<br>_x__Social and Cross-Cultural Skills<br>_x__Productivity and Accountability<br>_x__Leadership and Responsibility |

| **Enduring Understandings:** | **Essential Questions:** |
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| *Students will understand that . . .* | |
| *EU 1*<br>an internal combustion engine has multiple systems that are all integrated with one another. | *EU 1*<br>• How do the multiple engine systems work together?<br>• What happens if one system in an internal combustion engine doesn't work properly? |
| *EU 2*<br>multiple engine types and classifications are used for a variety of reasons. | *EU 2*<br>• When would a consumer choose a diesel engine over a gasoline engine or vice-versa?<br>• What would justify the use of a two stroke engine over a four stroke according to the EPA and why?<br>• Why are there different engine configurations? |
| *EU 3*<br>engines have various sizes and performance ratings. | *EU 3*<br>• What is the benefit of multiple cylinder engines?<br>• How does the engine compression ratio affect engine performance?<br>• Why do people install aftermarket exhaust systems? |

| **Knowledge:**<br>*Students will know . . .* | **Skills:**<br>*Students will be able to . . .* |
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| *EU 1*<br>• how cooling, lubrication, starting, charging, ignition, fuel, and emission control systems operate independently and work together as a complete system.<br><br>*EU 2*<br>• the advantages and disadvantages of a diesel and gasoline engine.<br>• the advantages and disadvantages of a two and four stroke engine.<br>• how to identify multiple engine configurations.<br><br>*EU 3*<br>• what bore stroke ratio is and how it affects performance.<br>• how atmospheric pressure affects engine performance.<br>• a variety of ways to enhance engine performance to increase power and efficiency.<br>• how exhaust effects engine performance.<br>• how to safely use welding equipment to modify exhaust. | *EU 1*<br>• explain the purpose of major systems and their parts.<br>• explain the relationship between the major systems of an engine.<br>• diagram the major components of an engine.<br><br>*EU 2*<br>• explain basic automotive engine classifications.<br>• compare gasoline and diesel engines.<br>• contrast combustion chamber designs.<br>• compare two and four stroke cycle engines.<br><br>*EU 3*<br>• apply different methods used to measure and rate engine performance.<br>• compare and contrast different ways to enhance performance.<br>• compare the difference between turbocharging and supercharging.<br>• evaluate the efficiency of performance modifications.<br>• weld using arc welding, gas welding, and mig welding. |

## Stage 2 – Assessment Evidence

**Other Recommended Evidence:**

- Quiz/Test
- Worksheets
- Workbooks
- Discussions
- ProDemand 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 internal combustion engines and their various systems.(A)
- Teacher led demonstration on how to disassemble and reassemble a small engine. (A)
- Student led demonstration on how to disassemble and reassemble a small engine. (M, T)
- Student led discussion on diagnosis of common engine problems in small engines. (T)
- Practice new skill sets on demonstration engines while using tools safely (M)
- Teacher led demonstration on how to disassemble and reassemble a full size automotive engine. (A)
- Student led demonstration on how to disassemble and reassemble a full size automotive engine. (T)
- Student led discussion on diagnosis of common engine problems in full size engines. (T)
- Demonstration on ProDemand software (A)
- Complete worksheet using ProDemand software (M,T)
- Videos on engines. (A)
- Teacher led discussion on maintaining fluids in a vehicle. (A)
- Student demonstrations on maintaining fluids in a vehicle (M,T)
- Workbook on Engine unit such as chapters 11, 12, 16, and 28 in *Modern Automotive Technology Book* (A)
- Demonstration on welding (A)
- Practice various welding types and techniques (T)
- Videos on welding (A)