Course: *Automotive Technology* **Unit #:** *Internal Combustion Engine - Unit 2*	**Year of Implementation:** 2024-2025
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Stage One - Desired Results

Link(s) to New Jersey Student Learning Standards for this course:
{provide all applicable links to standards here}
https://www.state.nj.us/education/cccs/2020/

- **Unit Standards:** *(keep each of the following headings in place)*
  - ***Content Standards***
    - List all content-specific standards that apply to this unit here
  - ***21st Century Life & Career Standards***
    - All curriculum writers/revisionists need to include standards that apply to "Career Readiness, Life Literacies, and Key Skills". This should include a brief description of the standard and the standard number. Document only those standards and practices that apply to each unit. Use the following link to assist you [see pages of 31-36; 41-42; 53-56 for specific standard #'s and strands] https://www.state.nj.us/education/cccs/2020/2020%20NJSLS-CLKS.pdf
  - ***English Companion Standards***
    - List grade-level appropriate companion standards for History, Social Studies, Science and Technical Subjects (CTE/Arts) 9-12. English Companion Standards are required only in these subject/content areas. This section can be deleted for all other content areas.
    - Grade 9-10 Companion Standards: https://www.nj.gov/education/standards/ela/Docs/2016NJSLS-ELA_Companion9-10.pdf
    - Grade 11-12 Companion Standards: https://www.nj.gov/education/standards/ela/Docs/2016NJSLS-ELA_Companion11-12.pdf
  - ***Interdisciplinary Content Standards***
    - List any standards from other content areas that apply to this unit.
  - ***NJ Statutes:*** NJ State law mandates the inclusion of the following topics in lesson design and instruction as aligned to elementary and secondary curriculum.

Amistad Law: N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African-Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

Holocaust Law: N.J.S.A. 18A:35-28 Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35 A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards (N.J.S.A.18A:35-4.36) A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Diversity and Inclusion (N.J.S.A. 18A:35-4.36a) A board of education shall incorporate instruction on diversity and inclusion in an appropriate place in the curriculum of students in grades kindergarten through 12 as part of the district's implementation of the New Jersey Student Learning Standards.

Asian American and Pacific Islanders (AAPI) P.L.2021, c.410 Ensures that the contributions, history, and heritage of Asian Americans and Pacific Islanders (AAPI) are included in the New Jersey Student Learning Standards (NJSLS) for Social Studies in kindergarten through Grade 12 (P.L.2021, c.416)

For additional information, see

NJ Amistad Curriculum: https://www.nj.gov/education/amistad/about/

Diversity and Inclusion: ***https://www.nj.gov/education/standards/dei/index.shtml***

- *(Sample Activities/ Lessons):* ***https://www.nj.gov/education/standards/dei/samples/index.shtml***

Asian American and Pacific Islanders:

- ***Asian American and Pacific Islander Heritage and History in the U.S.***
  A Teacher's Guide from EDSITEment offering a collection of lessons and resources for K-12 social studies, literature and arts classrooms that center around the experiences, achievements and perspectives of Asian Americans and Pacific Islanders across U.S. history.

Transfer Goal: Students will be able to independently use their learning to *communicate effectively to describe, analyze and diagnose drivability and performance related malfunctions.*

As aligned with LRHSD Long Term Learning Goal(s):https://www.lrhsd.org/Page/6163

1. communicate and collaborate using appropriate technical terms to describe, analyze, interpret, and judge their work and the work of others
2. acquire, integrate, and apply design processes and essential technical skills to solve problems, create products, and improve the quality of life for our local and global community
3. communicate and collaborate using appropriate technical terms to describe, analyze, interpret, and judge their work and the work of others
4. acquire, integrate, and apply design processes and essential technical skills to solve problems, create products, and improve the quality of life for our local and global community

Enduring Understandings {use Arial 11 font]	*Essential Questions* {use Arial 11 font]
Students will understand that. . . *EU 1* • effective communication and knowledge of vehicle's systems allow technicians to solve problems more efficiently. *EU 2*	• How do you communicate with someone who speaks a different language than you? • What happens to the fuel you put into your vehicle? • How can you enhance a vehicle to increase performance?

● vehicle diagnostics allow the maintenance of automotive systems to optimize vehicle operations and minimize premature wear.	
<u>Knowledge</u> *Students will know . . .* *EU 1* ● the fundamentals of various systems inside the internal combustion engine. ● the various classifications of engines ● how various engine designs can affect performance ● EU 2 ● the advantages and disadvantages of a diesel and gasoline engine. ● the advantages and disadvantages of a two and four stroke engine. ● how to identify multiple engine configurations. EU 3 ● what bore stroke ratio is and how it affects performance. ● how atmospheric pressure affects engine performance. ● a variety of ways to enhance engine performance to increase power and efficiency. ● how exhaust effects engine performance. ● how to safely use welding equipment to modify exhaust.	*<u>Skills</u>* *Students will be able to. . .* *EU 1* ● diagram the major components of an engine. ● explain the purpose of major systems and their parts. ● explain the relationship between the major systems of an engine. *EU 2* ● explain basic automotive engine classifications. ● compare gasoline and diesel engines. ● contrast combustion chamber designs. ● compare two and four stroke cycle engines. *EU 3* ● apply different methods used to measure and rate engine performance. ● compare and contrast different ways to enhance performance. ● compare the difference between turbocharging and supercharging. ● evaluate the efficiency of performance modifications. ● weld using arc welding, gas welding, and mig welding.

Stage Two - Assessment

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Stage Three - Instruction

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.** *{place A, M and/or T along with the applicable EU number in parentheses after each statement} All knowledge and skills must be addressed in this section with a corresponding lesson/activity which teaches each concept. The following color codes are used to notate activities that correspond with interdisciplinary connections and 21st Century Life & Career Connections (which involves Technology Literacy): Red = Interdisciplinary Connection; Purple = 21st Century Life & Career Connection*

- *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)*

Pacing Guide

{This chart will be identical in all of the units for this course.}

Unit #	***Title of Unit***	***Approximate # of teaching days***
1	*Safety, Equipment and Measuring*	30
2	*Internal Combustion Engine*	30
3	*Modern Automotive Systems*	75
4		

Instructional Materials

- *Modern Automotive Technology 9th Edition, Goodheart-Wilcox*
- *Pro Demand Software*
- *OBD scan tools*
- *Shop vehicle*
- *Automotive Lift*
- *Engine Stands*
- *Wrenches*
- *Sockets*
- *Screwdrivers*
- *Valve Spring Compressors*
- *Compressed Air*
- *Shop Rags*

- *Safety Glasses*
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Accommodations

Special Education: The curriculum will be modified as per the Individualized Education Plan (IEP). Students will be accommodated based on specific accommodations listed in the IEP.
Students with 504 Plans: Students will be accommodated based on specific accommodations listed in the 504 Plan.
English Language Learners: Students will be accommodated based on individual need and in consultation with the ELL teacher.
Students at Risk of School Failure: Students will be accommodated based on individual need and provided various structural supports through their school.
Gifted and Talented Students: Students will be challenged to enhance their knowledge and skills through acceleration and additional independent research on the subject matter.