



# **Automotive I**

## ***Course Description***

This course will introduce students to the operational and scientific nature of the automotive component systems including fuel, intake, exhaust, ignition, lubrication, braking, cooling, and suspension systems. Practical application of safe work habits and the correct use of tools and precision test instruments will be throughout the course. In addition, to meet the needs of changing technology, this program offers students the opportunity to master the necessary skills to pass the Automotive Service Excellence Certification (ASE) examination.

# Automotive I

| Pacing Guide |  |                  |
|--------------|--|------------------|
| Unit         | Topic                                  | Suggested Timing |
| Unit 1       | Basic Automotive Knowledge and Service | approx. 6 weeks  |
| Unit 2       | Basic Automotive Tools and Equipment   | approx. 7 weeks  |
| Unit 3       | Basic Automotive Skills                | approx. 17 weeks |
| Unit 4       | Leadership and Employability Skills    | approx. 5 weeks  |

## Educational Technology Standards

8.1.12.A.1, 8.1.12.B.2, 8.1.12.C.1, 8.1.12.D.1, 8.1.12.E.1, 8.1.12.F.1

- **Technology Operations and Concepts**
  - Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
- **Creativity and Innovation**
  - Apply previous content knowledge by creating and piloting a digital learning game or tutorial.
- **Communication and Collaboration**
  - Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.
- **Digital Citizenship**
  - Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.
- **Research and Information Literacy**
  - Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
- **Critical Thinking, Problem Solving, Decision Making**
  - Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

## Career Ready Practices

*Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.*

### **CRP1. Act as a responsible and contributing citizen and employee**

Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

### **CRP2. Apply appropriate academic and technical skills.**

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

### **CRP3. Attend to personal health and financial well-being.**

Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial well-being, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

### **CRP4. Communicate clearly and effectively and with reason.**

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

**CRP5. Consider the environmental, social and economic impacts of decisions.**

Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.

**CRP6. Demonstrate creativity and innovation.**

Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

**CRP7. Employ valid and reliable research strategies.**

Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

**CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.**

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

**CRP9. Model integrity, ethical leadership and effective management.**

Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.

**CRP10. Plan education and career paths aligned to personal goals.**

Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

**CRP11. Use technology to enhance productivity.**

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

**CRP12. Work productively in teams while using cultural global competence.**

Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

## Differentiated Instruction

### Strategies to Accommodate Students Based on Individual Needs

| <u>Time/General</u>   | <u>Processing</u>   | <u>Comprehension</u>  | <u>Recall</u>   |
|---|---|---|---|
| <ul style="list-style-type: none"> <li>Extra time for assigned tasks</li> <li>Adjust length of assignment</li> <li>Timeline with due dates for projects</li> <li>Communication system between home and school</li> <li>Provide notes/outline</li> </ul> | <ul style="list-style-type: none"> <li>Extra Response time</li> <li>Have students verbalize steps</li> <li>Repeat, clarify or reword directions</li> <li>Mini-breaks between tasks</li> <li>Provide a warning for transitions</li> <li>Work partners</li> </ul> | <ul style="list-style-type: none"> <li>Precise step-by-step directions</li> <li>Short manageable tasks</li> <li>Brief and concrete directions</li> <li>Provide immediate feedback</li> <li>Small group instruction</li> <li>Emphasize multi-sensory learning</li> </ul> | <ul style="list-style-type: none"> <li>Teacher-made checklist</li> <li>Use visual graphic organizers</li> <li>Reference resources to promote independence</li> <li>Visual and verbal reminders</li> <li>Graphic organizers</li> </ul> |
| <u>Assistive Technology</u>   | <u>Tests/Quizzes/Grading</u>  | <u>Behavior/Attention</u>   | <u>Organization</u>   |
| <ul style="list-style-type: none"> <li>Computer/whiteboard</li> <li>Audio Recorder</li> <li>Spell-checker</li> <li>Audio-taped books</li> </ul>   | <ul style="list-style-type: none"> <li>Extended time</li> <li>Study guides</li> <li>Shortened tests</li> <li>Read directions aloud</li> </ul>   | <ul style="list-style-type: none"> <li>Consistent daily structured routine</li> <li>Simple and clear classroom rules</li> <li>Frequent feedback</li> </ul>  | <ul style="list-style-type: none"> <li>Individual daily planner</li> <li>Display a written agenda</li> <li>Note-taking assistance</li> <li>Color code activities</li> </ul>   |



## Enrichment

### **Strategies Used to Accommodate Based on Students Individual Needs:**

- Adaption of Material and Requirements
- Evaluate Vocabulary
- Elevated Activity Complexity
- Additional Projects
- Independent Student Options
- Projects completed individual or with Partners
- Self Selection of Project
- Tiered/Multilevel Projects
- Learning Centers
- Individual Response Blog
- Independent Studies of Manuals
- Open-ended Projects
- Community/Subject expert mentorships

## Assessments

### Suggested Formative/Summative Classroom Assessments

- Graphic Organizers
- Teacher-created Unit Assessments, Chapter Assessments, Quizzes
- Systematic Skills assessment
- Accountable Talk, Oral Report, Think Pair, and Share
- Projects, Portfolio,
- Homework
- Schematic Mapping
- Photo, Video problem solving analysis
- NATEF task sheets
- NATEF end of program exams

## Interdisciplinary Connections

### English Language Arts

- Journal writing
- Close reading of Automotive-related content
- Create a brochure for a Auto industry
- Keep a running word wall of Automotive vocabulary

### Social Studies

- Research the history of a given Automotive Industry
- Research prominent historical individuals in Automotive Industry
- Use historical references to solve problems

### World Language

- Translate Automotive/Transportation-content
- Create a translated index of Automotive vocabulary
- Generate a translated list of words and phrases related to workplace safety

### Math

- Research Automotive occupation salaries for a geographic area and juxtapose against local cost of living
- Go on a geometry scavenger hunt within Automotive repair shop
- Track various data, such as Transportation's impact on the GDP, career opportunities or among individuals currently occupying Automotive careers

### Fine & Performing Arts

- Create a poster advertising your Automotive Repair Shop
- Design a flag or logo to represent your shop

### Science

- Research the environmental impact of Automotive industry
- Research latest developments in automotive technology
- Investigate automotive applicable-careers in STEM fields

## New Jersey Student Learning Standards

### 9.3– Career and Technical Education

#### TRANSPORTATION, DISTRIBUTION & LOGISTICS CAREER CLUSTER

- 9.3.12.TD.1: Describe the nature and scope of the Transportation, Distribution & Logistics Career Cluster and the role of transportation, distribution and logistics in society and the economy.
- 9.3.12.TD.2: Describe the application and use of new and emerging advanced techniques to provide solutions for transportation, distribution and logistics problems.
- 9.3.12.TD.3: Describe the key operational activities required of successful transportation, distribution and logistics facilities
- 9.3.12.TD.4: Identify governmental policies and procedures for transportation, distribution and logistics facilities
- 9.3.12.TD.5: Describe transportation, distribution and logistics employee rights and responsibilities and employers' obligations concerning occupational safety and health.
- 9.3.12.TD.6: Describe career opportunities and means to achieve those opportunities in each of the Transportation, Distribution & Logistics Career Pathways.

#### Pathway: FACILITY & MOBILE EQUIPMENT MAINTENANCE (TD□MTN)/ TRANSPORTATION OPERATIONS (TD□OPS)

- 9.3.12.TD□MTN.1: Develop preventative maintenance plans and systems to keep facility and mobile equipment inventory in operation.
- 9.3.12.TD□MTN.2: Design ways to improve facility and equipment system performance.
- 9.3.12.TD□OPS.1: Develop and evaluate transportation plans to move people and/or goods to meet customer requirements.
- 9.3.12.TD□OPS.2: Analyze performance of transportation operations in order to improve quality and service levels and increase efficiency.

## Common Career Technical Core (CCTC)

### Career Cluster Education & Training

TD 01 – Describe the nature and scope of the Transportation, Distribution & Logistics Career Cluster and the role of transportation, distribution and logistics in society and the economy.

- TD 01.3 – Identify the major modes of transportation and their role in society.

TD-MTN 1– Develop preventative maintenance plans and systems to keep facility and mobile equipment inventory in operation.

- TD-MTN 01.1 – Develop preventive maintenance plans and systems to meet equipment manufacturer requirements.
- TD-MTN 01.2 – Apply strategies used to monitor and evaluate the performance of maintenance plans and systems.

TD-MTN 2– Design ways to improve equipment performance.

- TD-MTN 02.1 – Develop plans for improving equipment performance.
- TD-MTN 02.2 – Execute repair plans for mobile equipment.
- TD-MTN 02.3 – Develop and execute repair plans based upon an assessment of the equipment inventory.

TD-HSE 1- Describe the health, safety and environmental rules and regulations in transportation workplace.

- TD-HSE 1.1 – Conduct audits and inspections and evaluate compliance with company policies and government laws and regulations.
- TD-HSE 1.3– Manage the ongoing implementation of health, safety and environmental policies, procedures and documentation systems including development of communication plans that promote and support the effort.

## Common Core State Standards (CCSS)

### CCSS - English-Language Arts

#### Key Ideas and Details:

- CCSS.ELA-LITERACY.RST.11-12.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

#### Craft and Structure:

- CCSS.ELA-LITERACY.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11-12 texts and topics.

#### Integration of Knowledge and Ideas:

- CCSS.ELA-LITERACY.RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

#### Range of Reading and Level of Text Complexity:

- CCSS.ELA-LITERACY.RST.11-12.10 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

## Common Core State Standards (CCSS)

### CCSS - Mathematics

#### Explain volume formulas and use them to solve problems:

- CCSS.MATH.CONTENT.HSG.GMD.A.1 Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder.
- CCSS.MATH.CONTENT.HSG.GMD.A.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

#### Apply geometric concepts in modeling situations:

- CCSS.MATH.CONTENT.HSG.MG.A.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder)
- CCSS.MATH.CONTENT.HSG.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., BTUs per cubic foot).
- CCSS.MATH.CONTENT.HSG.MG.A.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost).

#### Reason quantitatively and use units to solve problems:

- CCSS.MATH.CONTENT.HSN.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
- CCSS.MATH.CONTENT.HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

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| <p><b>Course:</b> Automotive I</p> <p><b>Unit:</b> II – Tools and Equipment</p> <p><b>Grade Level:</b> 9-12</p>   | <p><b>Unit Overview:</b></p> <p>This course will introduce students to the operational and scientific nature of the automotive component systems including fuel, intake, exhaust, ignition, lubrication, braking, cooling, and suspension systems. Practical application of safe work habits and the correct use of tools and precision test instruments will be the focus of this unit. Understanding of basic automotive tools is an essential step in fulfilling the training that is needed for an automotive service career.</p> |
| <p><b>New Jersey Student Learning Standards (NJSLS):</b> 9.3.12.TD.1, 9.3.12.TD.2, 9.3.12.TD.3, 9.3.12.TD.6</p>   |   |
| <p><b>Common Career Technical Core (CCTC):</b> TD-MTN 02.2,TD-MTN 02.3, TD-HSE 1.3</p>  |   |
| <p><b>Common Core State Standards (CCSS):</b> RST.11-12.3; RST.11-12.4; RST.11-12.7; RST.11-12.10; HSG.GMD.A.1; HSG.GMD.A.3; HSG.MG.A.1; HSG.MG.A.2; HSG.MG.A.3; HSN.Q.A.1; HSN.Q.A.3</p> |   |

| Student Learning Objectives (SLOs)   | Essential Questions  | Skills & Indicators  | Sample Activities   | Resources  |
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| <p>Identify, choose, use, and maintain hand tools, such as screwdrivers, pliers, hammers, chisels, punches, special applications wrenches and sockets, files, hack saws, bench vises and C clamps</p> <p><b>NJSLS:</b> 9.3.12.TD.3, 9.3.12.TD.2, 9.3.12.TD.6</p> | <p>What are the basic hand tools utilized in basic auto maintenance and repair?</p> <p>Why is it important to ensure tools are safe and in proper working condition?</p> <p>What are some of the specialty tools involved in Front end repair?</p> | <ul style="list-style-type: none"> <li>• Identify basic hand tools and special tools used in engine repair</li> <li>▪ Identify tools used to service drivelines.</li> <li>▪ Replace a hammer handle, dress a grinding stone, screwdriver and punch</li> <li>▪ Sharpen a chisel, drill bit</li> </ul> | <p><b>Graphic Organizer</b></p> <p>Given a set of hand tools and access to a tool room, perform an Inventory and record any tools that are unsafe, broken or need repairs</p> <p><b>Writing Exercise</b></p> <p>Explain in an essay the purpose of hand tools</p> | <p><b>OSHA Website</b><br/> <a href="https://www.osha.gov/law-regs.html">https://www.osha.gov/law-regs.html</a></p> <p><b>Auto Safety Government Website</b><br/> <a href="http://www.autosafety.org/">http://www.autosafety.org/</a></p> <p><b>Automotive Glossary and Tool Identification</b><br/> <a href="http://www.samarins.com/glossary/">http://www.samarins.com/glossary/</a></p> |



| Student Learning Objectives (SLOs)   | Essential Questions  | Skills & Indicators   | Sample Activities  | Resources   |
|--|--|---|--|---|
| <p><b>CCTC:</b> TD-MTN 02.1, TD-MTN 02.2, TD-HSE 1.1,</p> <p><b>CCSS:</b> RL.9-10.1; RI.9-10.5; SL.9-10.1</p>  | <p>Engine repair?</p> <p>What are the proper procedures for replacing blades and bits?</p>   | <ul style="list-style-type: none"> <li>▪ Identify and maintain four types of files</li> <li>▪ Use an adjustable wrench and breaker bar</li> </ul>   |  |   |
| <p>Identify and demonstrate use of precision measuring tools.</p> <p><b>NJSLS:</b> 9.3.12.TD.3, 9.3.12.TD.2, 9.3.12.TD.6</p> <p><b>CCTC:</b> TD-MTN 02.1, TD-MTN 02.2, TD-HSE 1.1,</p> <p><b>CCSS:</b> RL.9-10.1; RI.9-10.5; SL.9-10.1</p> | <p>How can we identify the primary components of the engine?</p> <p>Why do manufacturers require a cylinder be checked for proper specifications (diameter)?</p> <p>What is the proper use and reading of a Micrometer? What are its primary uses in the lab?</p> <p>What are the primary uses for slide calipers?</p> | <ul style="list-style-type: none"> <li>▪ Demonstrate the use of a slide caliper</li> <li>▪ Use a torque wrench, bar and micrometer type</li> <li>▪ Measure a cylinder for taper, out-of-round and diameter</li> <li>▪ Measure flywheel run-out</li> <li>▪ Identify the (5) major uses for slide calipers</li> </ul> | <p><b>Lab/Math Exercise</b><br/>           Given the proper measuring tool and a crankshaft, cylinder and flywheel, measure these units. Result should be within .0005 inch of industry specifications</p> <p><b>Journal</b><br/>           Write a journal entry outlining procedure for measuring cylinders, crankshaft and flywheels.</p> <p><b>Venn Diagram</b><br/>           Create a Venn Diagram</p> | <p><b>OSHA Website</b><br/> <a href="https://www.osha.gov/law-regs.html">https://www.osha.gov/law-regs.html</a></p> <p><b>Auto Safety Government Website</b><br/> <a href="http://www.autosafety.org/">http://www.autosafety.org/</a></p> <p><b>National Highway Traffic Safety Administration</b><br/> <a href="http://www.nhtsa.gov/Vehicle+Safety">http://www.nhtsa.gov/Vehicle+Safety</a></p> |

| Student Learning Objectives (SLOs)  | Essential Questions  | Skills & Indicators  | Sample Activities  | Resources   |
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|   |  |  | that compares and contrasts how different measuring devices are similar and different.   |   |
| <p>Apply basic welding skills related to the automobile industry. Apply basic welding skills, following electrical and acetylene safety rules.</p> <p><b>NJSLS:</b> 9.3.12.TD.3, 9.3.12.TD.2, 9.3.12.TD.6</p> <p><b>CCTC:</b> TD-MTN 02.1, TD-MTN 02.2, TD-HSE 1.1,</p> <p><b>CCSS:</b> RL.9-10.1; RI.9-10.5; SL.9-10.1</p> | <p>What are the specific personal safety rules and procedures for welding and cutting?</p> <p>What are the hazards of using acetylene-welding equipment?</p> <p>In case of fire what are the exit plans from the lab area?</p> | <ul style="list-style-type: none"> <li>▪ Identify the parts of oxyacetylene welding equipment</li> <li>▪ List rules for safe handling of oxygen and acetylene equipment</li> <li>▪ Demonstrate the ability to turn on, light, adjust flame and turn off the oxyacetylene equipment</li> <li>▪ Name the welding positions</li> <li>▪ Demonstrate the ability to start, stop and restart a bead</li> <li>▪ Describe the effects of raising and lowering the arc welding current</li> <li>▪ List reasons for a</li> </ul> | <p><b>Lab Exercise</b><br/>           Given flat metal and the proper welding equipment, apply basic welding skills, following electrical safety rules and acetylene welding rules using the welding manual as a guide for identifying proper welds.</p> <p><b>Science Lab</b><br/>           Web quest “How Welding Works”<br/> <a href="http://science.howstuffworks.com/welding1.htm">http://science.howstuffworks.com/welding1.htm</a></p> | <p><b>AutoEducation.com</b><br/> <a href="http://www.internet4classrooms.com/ct-auto.htm">http://www.internet4classrooms.com/ct-auto.htm</a></p> <p><b>OSHA</b><br/>           Welding, Cutting, Brazing<br/> <a href="https://www.osha.gov/SLTC/weldingcuttingbrazing/standards.html">https://www.osha.gov/SLTC/weldingcuttingbrazing/standards.html</a></p> <p><b>Miller Welding</b><br/>           MIG Welding Basics for Automotive Repair<br/> <a href="https://www.millerwelds.com/resources/article-library/mig-welding-basics-for-farm-and-automotive-repair">https://www.millerwelds.com/resources/article-library/mig-welding-basics-for-farm-and-automotive-repair</a></p> |

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| <p>Develop the special skills needed for using and maintaining power tools, such as drills, bench grinders, drill presses, hydraulic presses, impact wrenches.</p> <p><b>NJSLS:</b> 9.3.12.TD.3, 9.3.12.TD.2, 9.3.12.TD.6</p> <p><b>CCTC:</b> TD-MTN 02.1, TD-MTN 02.2, TD-HSE 1.1,</p> <p><b>CCSS:</b> RL.9-10.1; RI.9-10.5; SL.9-10.1</p> | <p>What dangers do frayed and exposed power cables create in the Lab?</p> <p>What different types of electrical service (amps, watts, volts) are used in in different power tools? Why is proper identification important?</p> <p>Why is eye and ear protection important when utilizing power tools?</p> | <p>poor weld</p> <ul style="list-style-type: none"> <li>▪ Describe safety rules for power equipment and tools</li> <li>▪ Demonstrate the ability to drill a hole using a drill press</li> <li>▪ Demonstrate the ability to cut metal with a power chisel</li> <li>▪ Raise a vehicle on a vehicle hoist</li> <li>▪ Raise a vehicle using a hydraulic jack, placing jack stands under the vehicle for safety</li> <li>▪ Demonstrate a safe method of washing parts</li> <li>▪ Demonstrate removing a bearing from a shaft using a hydraulic press</li> </ul> | <p><b>Poster</b><br/>Create a poster identifying electrical hazards when using power tools</p> <p><b>Diagram</b><br/>Proper procedure for using jack stands</p> <p><b>Inspection/Checklist</b><br/>Create detailed procedure for using vehicle hoist</p> | <p><b>Western Michigan Univ.</b><br/>Extensive PDF file on General Shop Safety<br/><a href="http://wmich.edu/engineer/ceee/edcsi/pdf/f212_safety_rules.pdf">http://wmich.edu/engineer/ceee/edcsi/pdf/f212_safety_rules.pdf</a></p> <p><b>UAW Electrical Safety</b><br/>Excellent work safety PDF on Auto specific electrical safety<br/><a href="https://www.osha.gov/dte/grant_materials/fy09/sh-18794-09/electrical_safety_manual.pdf">https://www.osha.gov/dte/grant_materials/fy09/sh-18794-09/electrical_safety_manual.pdf</a></p> <p><b>OSHA</b><br/>Hand and Power Tool Safety<br/><a href="https://www.osha.gov/Publications/osa3080.pdf">https://www.osha.gov/Publications/osa3080.pdf</a></p> |
| <p>Identify and install select fasteners and follow manufacturer's</p>  | <p>What are thread tap and dies? How are they</p>   | <ul style="list-style-type: none"> <li>▪ Demonstrate how to select the proper fasteners for a project</li> </ul>   | <p><b>Lab Exercise</b><br/>Given a selection of fasteners, secure metals</p>   | <p><b>EPA</b><br/>Automotive waste disposal page</p>  |

| Student Learning Objectives (SLOs)  | Essential Questions   | Skills & Indicators  | Sample Activities   | Resources  |
|---|---|--|---|--|
| <p>specifications on fastener selection and installation. Use and install fasteners, such as screws and bolts, key screw extractors, helicoil inserts and thread tap and dies.</p> <p><b>NJSLS:</b> 9.3.12.TD.3, 9.3.12.TD.2, 9.3.12.TD.6</p> <p><b>CCTC:</b> TD-MTN 02.1, TD-MTN 02.2, TD-HSE 1.1,</p> <p><b>CCSS:</b> RL.9-10.1; RI.9-10.5; SL.9-10.1</p> | <p>used?</p> <p>What are the different types of fasteners? What are they used for?</p> <p>How are broken fasteners removed without damage to other components?</p> <p>What type(s) of injuries can occur if [Hazmat] are not properly dealt with?</p> <p>What is a helicoil? What is it used for?</p> | <ul style="list-style-type: none"> <li>▪ Demonstrate the use of a pitch gauge</li> <li>▪ Cut external and internal threads using die and tap</li> <li>▪ Describe the procedure for removing broken bolts and taps</li> <li>▪ Describe and explain usage of five types of nuts</li> <li>▪ Demonstrate the use of pop rivet pliers</li> <li>▪ Identify a taper and a bottoming tap</li> <li>▪ Differentiate between the customary and metric thread specifications of bolts</li> <li>▪ Explain how a helicoil is used to repair damaged threads</li> <li>▪ Explain bolt classifications</li> </ul> | <p>or components to vehicle</p> <p><b>Math Exercise</b></p> <p>Develop math equations to convert customary to metric fastener sizes</p> | <p><a href="https://www.epa.gov/uic/motor-vehicle-waste-disposal-wells">https://www.epa.gov/uic/motor-vehicle-waste-disposal-wells</a></p> <p><b>EPA</b><br/>Environmental Compliance Guide for Auto Repair Shops<br/><a href="http://www.epa.ohio.gov/portals/41/sb/publications/AutoRepairGuide.pdf">http://www.epa.ohio.gov/portals/41/sb/publications/AutoRepairGuide.pdf</a></p> <p><b>OSHA</b><br/>Hazardous Materials<br/><a href="https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&amp;p_id=9760">https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&amp;p_id=9760</a></p> |
| <p>Use basic electrical equipment and meters to</p>   | <p>What are the safety precautions necessary</p>  | <ul style="list-style-type: none"> <li>▪ Demonstrate safety precautions when</li> </ul>  | <p><b>Inspection/Checklist</b></p> <p>Demonstrate proper connecting and</p>   | <p><b>Automotive Electrical Fundamentals</b></p> <p>Online tutorials on</p>  |

| Student Learning Objectives (SLOs)   | Essential Questions   | Skills & Indicators  | Sample Activities  | Resources  |
|--|---|--|--|--|
| <p>test automotive electrical system and ancillary components</p> <p><b>NJSLS:</b> 9.3.12.TD.3, 9.3.12.TD.2, 9.3.12.TD.6</p> <p><b>CCTC:</b> TD-MTN 02.1, TD-MTN 02.2, TD-HSE 1.1,</p> <p><b>CCSS:</b> RL.9-10.1; RI.9-10.5; SL.9-10.1</p> | <p>when assessing electrical components?</p> <p>What are primary signs of electrical system failure?</p> <p>What are some of the specialty equipment utilized when testing automotive electrical systems?</p> | <p>connecting and disconnecting the test equipment</p> <ul style="list-style-type: none"> <li>▪ Describe use of the electrical tester</li> <li>▪ Demonstrate the use of an ohm meter and multimeter</li> <li>▪ Describe analog and digital test meters</li> <li>▪ Demonstrate the use of a test light</li> </ul> | <p>disconnecting of the electrical test equipment</p> <p><b>Prezy/Power Point</b><br/>Describe the operation of an electrical analyzer</p> <p><b>Lab Exercise</b><br/>Given a vehicle, connect the electrical and electronic testers into the electrical system, following the instructions in the manufacturer's handbooks and charts of the electrical tester. Test the electrical system using specifications from the manufacturer's repair manual. Record information obtained.</p> | <p>Automotive electrical Systems<br/><a href="http://www.autoshop101.com">http://www.autoshop101.com</a></p> <p><b>OSHA</b><br/>Electrical safety.<br/><a href="https://www.osha.gov/SLTC/electrical/index.html">https://www.osha.gov/SLTC/electrical/index.html</a></p> |

## Unit 2 Vocabulary

Die  
Tap  
Solvent  
Metric System  
Society Automotive Engineers (SAE)  
Punch  
Socket  
Micrometer  
Drift  
Vise  
Pliers  
Crankshaft  
Flywheel  
Caliper  
Runout  
Specifications  
Acetylene  
Arc Welding  
Oxyacetylene

Impact Wrenches  
Air Chisels  
Hydraulic  
Drill Press  
Vehicle Hoist  
Ohm Meter  
Multimeter

## Suggested Unit Projects

*Choose At Least One*

### **Poster/Diagram Exercise**

Develop and illustrate wiring diagram for basic parallel automotive electrical circuit

### **Group Exercise**

Select Auto or Large Automotive component (Engine, Body) to rebuild for end of year project.

## Suggested Structured Learning Experiences

Pompton Lakes Chamber of Commerce, 17th Annual Classic Car Show October 9th (Rain Date October 16th)  
 Downtown Wanaque Ave., Pompton Lakes  
<http://www.pomptonlakeschamber.org>

Lincoln Tech  
 70 McKee Drive Mahwah, NJ 07430  
 Phone: (201) 529-1414  
 Email: [info@allairevillage.org](mailto:info@allairevillage.org)  
<http://www.lincolntech-usa.com/>

Promar Engine Rebuilding  
 10 Peach Street,  
 Paterson New Jersey 07503  
 Phone: 973-684-1500  
<http://www.promarengine.com/contact-us.php>