

Automotive III

Course Description

This course will introduce students to the operational and automotive component systems focusing on the power-plant and transmission. Specifically but not restricted to fuel, intake, exhaust, ignition and automatic and manual transmission 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 III

Pacing Guide		
Unit	Topic	Suggested Timing
Unit 1	Automotive Electronics	approx. 9 weeks
Unit 2	Automotive Heating and Cooling	approx. 9 weeks
Unit 3	Automotive Advanced Engine Repair I	approx. 8 weeks
Unit 4	Automotive Advanced Engine Repair II	approx. 9 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"> • Extra time for assigned tasks • Adjust length of assignment • Timeline with due dates for projects • Communication system between home and school • Provide notes/outline 	<ul style="list-style-type: none"> • Extra Response time • Have students verbalize steps • Repeat, clarify or reword directions • Mini-breaks between tasks • Provide a warning for transitions • Work partners 	<ul style="list-style-type: none"> • Precise step-by-step directions • Short manageable tasks • Brief and concrete directions • Provide immediate feedback • Small group instruction • Emphasize multi-sensory learning 	<ul style="list-style-type: none"> • Teacher-made checklist • Use visual graphic organizers • Reference resources to promote independence • Visual and verbal reminders • Graphic organizers
<u>Assistive Technology</u>	<u>Tests/Quizzes/Grading</u>	<u>Behavior/Attention</u>	<u>Organization</u>
<ul style="list-style-type: none"> • Computer/whiteboard • Audio Recorder • Spell-checker • Audio-taped books 	<ul style="list-style-type: none"> • Extended time • Study guides • Shortened tests • Read directions aloud 	<ul style="list-style-type: none"> • Consistent daily structured routine • Simple and clear classroom rules • Frequent feedback 	<ul style="list-style-type: none"> • Individual daily planner • Display a written agenda • Note-taking assistance • Color code activities

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.

<p>Course: Automotive III</p> <p>Unit: I – General Electrical Diagnosis and Repair</p> <p>Grade Level: 9-12</p>	<p>Unit Overview:</p> <p>This course will introduce students to the operational and diagnostic phase of the automotive component systems. Primary electrical components, especially in the steering column and dash area of the automobile. In addition maintenance and repair of supplemental restraint system (SRS). Practical application of safe work habits and the correct use of tools and precision test instruments will be throughout the unit. Understanding of intermediate to advanced automotive tools; safety practices and problem solving diagnostics are the essential next step in fulfilling the training that is needed for an automotive service career.</p>
<p>New Jersey Student Learning Standards (NJSLS): 9.3.12.TD.1, 9.3.12.TD.6,9.3.12.TD.5, 9.3.12.TD OPS.2</p>	
<p>Common Career Technical Core (CCTC): TD 01.3, TD-MTN 02.2, TD-MTN 02.3,TD-HSE 1.1</p>	
<p>Common Core State Standards (CCSS): 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
<p>Diagnose electrical engine malfunctions utilizing manual and necessary tools, perform electrical test for an electrical malfunction.</p> <p>NJSLS: 9.3.12.TD.1, 9.3.12.TD.6,9.3.12.TD.5, 9.3.12.TD OPS.2</p> <p>CCTC: TD 01.3, TD-</p>	<p>What are the dangers inherently associated with automotive electrical components?</p> <p>How do we properly work around them in order to assess problem?</p> <p>What are specialty tools used to assess source of electrical components?</p>	<ul style="list-style-type: none"> ▪ Demonstrate safety precautions when performing electrical tests ▪ Explain test equipment hook-ups ▪ Describe which test to perform for specific malfunction ▪ Explain procedure for removal and replacement of 	<p>Lab</p> <p>Given an engine with electrical malfunctions. Determine likely source for problem and assess proper procedures to validate.</p> <p>Inspection/Checklist</p> <p>Conduct an inspection of given electrical components following</p>	<p>EPA</p> <p>Automotive Electrical Diagnosis https://www.youtube.com/watch?v=g5n8zt7shD4</p> <p>EPA</p> <p>Environmental Compliance Guide for Auto Repair Shops https://www.ericthecargu.com/faq/solving-automotive-electrical-</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>MTN 02.2, TD-MTN 02.3, TD-HSE 1.1</p> <p>CCSS: CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1 HSG.GMD.A.3; HSG.MG.A.1; HSN.Q.A.1; HSN.Q.A.3</p>	<p>What parts of the engine can be damaged because of electrical components?</p>	<p>malfunctioning component</p> <ul style="list-style-type: none"> ▪ Demonstrate the ability to put tools and equipment away in proper place after use 	<p>proper safety techniques utilizing a checklist.</p>	<p>problems OSHA Hazardous Materials https://www.osha.gov/Publications/electrical_safety.html</p>
<p>Given a typical shop repair locate an open circuit or a short circuit malfunctioning electrical system.</p> <p>NJSLS: 9.3.12.TD.1, 9.3.12.TD.6,9.3.12.TD.5, 9.3.12.TD OPS.2</p> <p>CCTC: TD 01.3, TD-MTN 02.2, TD-MTN 02.3, TD-HSE 1.1</p> <p>CCSS: CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1 HSG.GMD.A.3; HSG.MG.A.1;</p>	<p>What essential information is needed on customer information form?</p> <p>How can the customer information sheet be used to diagnose suspected problems?</p> <p>What types of repair work require eye and ear protection?</p>	<ul style="list-style-type: none"> ▪ Discuss how the whole wiring system of a vehicle can be broken down into individual electrical systems and the problem isolated to a particular system ▪ Demonstrate use of test equipment ▪ Identify the circuit and type of electrical failure ▪ Demonstrate the type of repair necessary to correct problem ▪ Demonstrate test for proper operation of 	<p>Lab Exercise Given a vehicle with a known ground, short, or open circuit, the proper tools and service manual, locate and repair the condition. The student should achieve accuracy, speed, and safety on the task..</p> <p>Journal Write a journal entry describing diagnostic steps for assessing electrical system failure.</p>	<p>Downloadable Auto Repair Invoice http://www.tidyforms.com/auto-repair-invoice.html</p> <p>Auto MD Diagnosing Automotive heating and cooling systems https://www.automd.com/diagnose/</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
HSN.Q.A.1; HSN.Q.A.3		repaired circuit		
<p>Given a vehicle, service manual, proper tools and test equipment, analyze cranking malfunctions in the Starting and Charging system.</p> <p>NJSLS: 9.3.12.TD.1, 9.3.12.TD.6,9.3.12.TD.5, 9.3.12.TD OPS.2</p> <p>CCTC: TD 01.3, TD-MTN 02.2, TD-MTN 02.3,TD-HSE 1.1</p> <p>CCSS: CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1 HSG.GMD.A.3; HSG.MG.A.1; HSN.Q.A.1; HSN.Q.A.3</p>	<p>How can we identify the common causes in engine starting system failure?</p> <p>What role does the battery play in the Starting System?</p> <p>How do diagnose a battery for effectiveness?</p> <p>How do diagnose a charging system for effectiveness?</p> <p>What precautions are necessary when working with batteries and charging system?</p>	<ul style="list-style-type: none"> ▪ Describe how a starting system operates ▪ State the purpose of neutral starting switch ▪ Test battery cables and connections ▪ Test starter current draw ▪ Explain the function of the starter solenoid ▪ Inspect and test starter replays and solenoids; replace as needed ▪ Explain the different ways that manufacturers check maximum output of their alternators ▪ Demonstrate use of and proper “hook-up” of alternator test equipment, analyze 	<p>Lab Exercise</p> <p>Given a vehicle, service manual, proper tools and test equipment, analyze cranking malfunctions in the starting system.</p> <p>Lab Exercise</p> <p>Given a vehicle, service manual, volt amp tester, and necessary tools, test alternator for maximum output. When completed the recorded output should be compared to specifications.</p> <p>Science Lab/Math Lab</p> <p>Utilize math formulas to develop deviations between measurements using base line manufacturer standards and scientific methods to</p>	<p>Carparts.com How the charging system works http://www.carparts.com/classroom/charging.htm</p> <p>AC Delco How automotive starting and charging systems work https://www.youtube.com/watch?v=y20ANfRMJ8A</p> <p>Automotive Appreciation Car Electrics Training Animation http://www.popularmechanics.com/cars/how-to/g767/10-diagnostic-apps-and-devices-to-make-you-a-better-driver</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
		<ul style="list-style-type: none"> ▪ results and determine needed repair ▪ Diagnose charging system malfunctions that cause an undercharge or no-charge condition ▪ Diagnose charging system malfunctions that cause an overcharge condition ▪ Describe proper charging procedures; slow and fast charge of conventional and maintenance free batteries ▪ Perform battery capacity (load, high rate discharge) test; determine needed service 	<p>explain relationship and affect within electrical charging system.</p>	
<p>Develop the special skills needed for Inspecting, removing and replacing alternator, starter, regulator and</p>	<p>How do check for serviceability, tension of alternator</p> <p>What dangers are present when checking</p>	<ul style="list-style-type: none"> ▪ Explain the important of belt tightness on an alternator-equipped vehicle ▪ Inspect drive belt for 	<p>Lab Given a vehicle, service manual, necessary tools and parts, remove, repair or replace starter. When completed, all terminals</p>	<p>OSHA Extensive PDF file on Electrical safety https://www.osha.gov/dte/grant_materials/fy10/sh-20999-</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>corresponding belts and hardware.</p> <p>NJSLS: 9.3.12.TD.1, 9.3.12.TD.6,9.3.12.TD.5, 9.3.12.TD OPS.2</p> <p>CCTC: TD 01.3, TD-MTN 02.2, TD-MTN 02.3,TD-HSE 1.1</p> <p>CCSS: CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1 HSG.GMD.A.3; HSG.MG.A.1; HSN.Q.A.1; HSN.Q.A.3</p>	<p>belt condition for serviceability, tension, and bolts for tightness?</p> <p>What is the need for a starter draw test?</p> <p>What is the job of the regulator? How do we replace it?</p>	<p>cracks and excessive wear</p> <ul style="list-style-type: none"> ▪ Demonstrate use of drive belt tension gauge “hand” method test ▪ Explain the need for a starter draw test ▪ Explain the need for a voltage drop test on the positive and negative side of the circuit ▪ Explain the results of the tests ▪ Inspect and test all parts for burning, wear and general condition ▪ Demonstrate bench test for proper operation ▪ Explain which systems have internal and which systems have external regulators and how the procedures for 	<p>must be secure, all bolts tightened and starter will operate to manufacturer’s specifications</p> <p>Given a vehicle, service manual, and proper tools, inspect, remove, replace and adjust the alternator belt. Check belt condition for serviceability, tension, and bolts for tightness.</p> <p>Video Create a video with fellow classmates outlining proper testing of belt tension.</p> <p>Inspection/Checklist Create a checklist in diagnosing starter, battery and alternator.</p>	<p>10/electrical_safety_manual.pdf</p> <p>AutoZone Car Care How to replace your starter https://www.youtube.com/watch?v=Ym9bgqbH-_4</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
		<ul style="list-style-type: none"> removing or replacing them differ ▪ Identify external regulator ▪ Demonstrate removal and replacement of external regulator and careful handling of electrical connections ▪ Identify internal regulator type of alternator ▪ Demonstrate removal and replacement of alternator and replacement of internal regulator 		
<p>Given circumstances of problematic electrical system test, remove and replace fusible links, fuses and circuit breakers.</p> <p>NJSLS: 9.3.12.TD.1, 9.3.12.TD.6,9.3.12.TD.5, 9.3.12.TD OPS.2</p>	<p>What steps are involved in assessing electrical system problems?</p> <p>What are and how are an ammeter, volt meter or test light used to determine current flow?</p> <p>What are the major components of fuse and</p>	<ul style="list-style-type: none"> • Demonstrate safety precautions while working on electrical unit • Explain how an ammeter, volt meter or test light can be used to determine current flow • Demonstrate proper 	<p>Lab Exercise Given a vehicle, service manual, proper tools and replacement parts, test, remove and replace a fusible link, fuse or circuit breaker. When finished the unit will be securely fastened in place. Circuit should be in operational order</p>	<p>OSHA Website https://www.osha.gov/law-regs.html</p> <p>Auto Safety Government Website http://www.autosafety.org/</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>CCTC: TD 01.3, TD-MTN 02.2, TD-MTN 02.3,TD-HSE 1.1</p> <p>CCSS: CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1 HSG.GMD.A.3; HSG.MG.A.1; HSN.Q.A.1; HSN.Q.A.3</p>	<p>circuit system in automobiles?</p> <p>Where are the fuses located in most automobiles?</p>	<p>use of ohm meter on unit being tested.</p> <ul style="list-style-type: none"> • Define circuit breaker and its function • Inspect and test fusible links, fuses, circuit breakers; replace as needed 	<p>when completed.</p> <p>Writing Exercise Outline steps in assessing fuse/circuit system functionality</p>	
<p>Inspect and repair lighting systems. Including diagnosis, repair or replace turn signal, stoplight and various other switches.</p> <p>NJSLS: 9.3.12.TD.1, 9.3.12.TD.6,9.3.12.TD.5, 9.3.12.TD OPS.2</p> <p>CCTC: TD 01.3, TD-MTN 02.2, TD-MTN 02.3,TD-HSE 1.1</p> <p>CCSS: CCSS: RL.9-10.1; RI.9-10.5; SL.9-</p>	<p>What are jumper wires and how are they used in testing electrical circuits and switches?</p> <p>What are wiring schematics? How are they used in assessing damaged or faulty switches?</p> <p>What parts of the electrical system can be damaged because of switch/light malfunctions?</p> <p>How to we replace, aim</p>	<ul style="list-style-type: none"> ▪ Demonstrate method of testing to be performed on a specific unit ▪ Demonstrate removal and installation of components ▪ Demonstrate use of wiring schematics ▪ Demonstrate proper use of test equipment to include: test light, DVOM, short finder ▪ Explain proper wire repair procedures ▪ Diagnose brighter 	<p>Lab Given a vehicle, service manual and necessary tools, diagnose, remove and replace switch. When completed all terminals must be secure, wires routed correctly and correct wire on correct terminal. The switch must be securely mounted and adjusted as needed.</p> <p>Inspection/Checklist Conduct an inspection of lighting system problem, service manual and</p>	<p>Strange Electrical Car Problems Troubleshooting Dim Headlights and Other electrical problems https://www.youtube.com/watch?v=wcbMuGE3rL4</p> <p>EPA Environmental Compliance Guide for Auto Repair Shops http://www.epa.ohio.gov/portals/41/sb/publication/s/AutoRepairGuide.pdf</p>

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10.1 HSG.GMD.A.3; HSG.MG.A.1; HSN.Q.A.1; HSN.Q.A.3	headlights?	than normal, intermittent, dim, or no light operation <ul style="list-style-type: none"> • Inspect, replace, aim headlights, and bulbs • Demonstrate use of DVOM • Demonstrate use of wiring schematics • Explain complete circuit of unit tested • Demonstrate test for proper operation 	necessary tools, diagnose the problem and make necessary repairs. Upon completion the system will operate correctly.	OSHA Occupational Noise Exposure https://www.osha.gov/SLTC/noisehearingconservation
Given a typical shop repair work order repair or replace power window and power seat systems, including motor driven accessories. NJSLS: 9.3.12.TD.1, 9.3.12.TD.6,9.3.12.TD.5, 9.3.12.TD OPS.2 CCTC: TD 01.3, TD-MTN 02.2, TD-MTN 02.3,TD-HSE 1.1	What essential information is needed for determining power window problems? How can the customer information sheet be used to diagnose suspected problems? What are some specialty tools utilized in power motor repair? What types of trim and moldings are needed to	<ul style="list-style-type: none"> ▪ Identify the components and circuits ▪ Demonstrate use of wiring schematics ▪ Demonstrate use of proper test equipment ▪ Demonstrate proper procedures of removal of trim panels and upholstery ▪ Diagnose incorrect operation of motor 	Lab Exercise Given a vehicle, service manual and proper tools, diagnose and repair power window and power seat circuits. When repair is completed all trim will have been installed correctly, and unit will function according to specifications. Journal Write a journal entry	How To Diagnose your Power Window Problem https://www.youtube.com/watch?v=2tLmH05UKwk Diagnosing Power Window Problems http://www.agcoauto.com/content/news/p2_articleid/153

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<p>CCSS: CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1 HSG.GMD.A.3; HSG.MG.A.1; HSN.Q.A.1; HSN.Q.A.3</p>	<p>be removed?</p>	<p>driven accessory circuits; repair or replace as needed</p> <ul style="list-style-type: none"> ▪ Diagnose incorrect heated glass operation; repair or replace as needed ▪ Diagnose incorrect electric door, hatch and trunk lock operation; repair or replace as needed ▪ Diagnose incorrect operation of cruise control systems; repair or replace as needed 	<p>describing diagnostic steps for assessing power equipment motors.</p>	
<p>Given a set of parameters from customer diagnose, repair or replace turn signal and stop light switches.</p> <p>NJSLS: 9.3.12.TD.1, 9.3.12.TD.6,9.3.12.TD.5, 9.3.12.TD OPS.2</p>	<p>How can we identify the common causes in Stop Light switches?</p> <p>What types of tools are utilized in diagnosis?</p> <p>Which form of diagnosis is most accurate?</p> <p>What precautions are necessary when working</p>	<ul style="list-style-type: none"> ▪ Demonstrate safety precautions while working on an electrical circuit ▪ Demonstrate use of DVOM ▪ Demonstrate use of wiring schematics ▪ Explain complete circuit of unit tested 	<p>Lab Exercise</p> <p>Given a vehicle, service manual and necessary tools, diagnose, remove and replace switch. When completed all terminals must be secure, wires routed correctly and correct wire on correct terminal. The</p>	<p>10 Diagnostic Apps Devices to Make You a Better Driver http://www.popularmechanics.com/cars/how-to/g767/10-diagnostic-apps-and-devices-to-make-you-a-better-driver</p> <p>Repairing Lights Replacing a turn Signal</p>

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<p>Develop the special skills needed for removal of engine and associated components; engine mounts.</p> <p>NJSLS: 9.3.12.TD.1, 9.3.12.TD.6,9.3.12.TD.5, 9.3.12.TD OPS.2</p>	<p>What dangers are present when using car and engine lifts?</p> <p>How is engine attached to vehicle chassis?</p> <p>When is it necessary to remove engine from chassis? What special tools are needed?</p>	<ul style="list-style-type: none"> ▪ Demonstrate safety procedures ▪ Explain the function of engine mounts ▪ Demonstrate removal of broken engine mounts (engine will be properly raised) ▪ Demonstrate replacement of new 	<p>Lab</p> <p>Given an automobile in need of engine mounts, tools, equipment and service manual, remove and replace engine mounts according to manufacturer's procedures.</p> <p>Video</p> <p>Create a video with</p>	<p>OSHA</p> <p>Extensive PDF file on Electrical safety https://www.osha.gov/dte/grant_materials/fy10/sh-20999-10/electrical_safety_manual.pdf</p> <p>Safely Cleaning and Engine https://www.youtube.com/watch?v=8m2qN</p>

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Unit 1 Vocabulary

Solenoid
Parasitic Drain
Anti-static devices
Starter relays
Catalysts
Circuit voltage
Memory functions
Gauge
Deviation
Component

Thermostat
Diagnostic
High-rate discharge
Deviation
Deteriorated
High-rate discharge
Resistance
state-of-charge
OSHA
EPA

Suggested Unit Projects

Choose At Least One

Management/Organizational Exercise

Develop relationship with local Dealership cooperative mentoring/intern program.

Individual/Group Project

Develop training tools for cooling system. Example: Refine use of new cooling chemicals and effective use and disposal.

Suggested Structured Learning Experiences

Technical Institute of America

AutoCAD Training
 New York City Location
 545 8th Avenue, 4th Floor
 New York, NY 10018
http://www.tiaedu.com/AutoCAD_Training_NYC_Class_Level_1.htm

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

BMW USA Corporate Headquarters

BMW of North America, LLC
 300 Chestnut Ridge Road
 Woodcliff Lake, NJ 07675
 Phone: 1-800-831-1117
<http://www.bmwusa.com/Standard/Content/CompanyInformation/>