

Department of College and Career Readiness

Automotive II

5.0 Credits



Unit Four

Automotive II

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 II

Pacing Guide		
Unit	Topic	Suggested Timing
Unit 1	Automotive Engine Repair	approx. 9 weeks
Unit 2	Automotive Engine Repair Phase II	approx. 10 weeks
Unit 3	Automotive Wheel Tire and Suspension	approx. 8 weeks
Unit 4	Automotive Brake Service	approx. 8 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 II Unit: IV – Brake Service Grade Level: 9-12</p>	<p>Unit Overview: This course will introduce students to the operational and diagnostic phase of the automotive component systems. Primary focus Automotive Brake systems analysis and repair. Diagnose poor stopping, noise, pulling, grabbing, dragging or pedal pulsation problems; determine needed repairs. 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.2, 9.3.12.TD.6</p>	
<p>Common Career Technical Core (CCTC): TD 01.3,TD-MTN 01.1, TD-MTN 01.2, TD-MTN 02.1,TD-MTN 02.2,TD-MTN 02.3</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 brake system problems. Inspect brake and wheel assemblies and perform proper cleaning procedures. Repair or replace as needed.</p> <p>NJSLS: 9.3.12.TD.4, 9.3.12.TD.2, 9.3.12.TD.1, 9.3.12.TD.2, 9.3.12.TD.6</p>	<p>What information is necessary on customer information sheet to diagnose brake problems? What are the primary signs of brake problems?</p> <p>What problems can arise from brake malfunction? Brake failure?</p>	<ul style="list-style-type: none"> Demonstrate safety while removing brake dust that may contain asbestos Demonstrate safety while removing and replacing brake parts Demonstrate safety regarding any brake fluid spillage <p>Demonstrate visual inspection of external</p>	<p>Lab Given a vehicle with brake problems, diagnose the brake system by evaluation of the customer's description of the problem, visual inspection and a road test, if the vehicle can be safely driven.</p>	<p>Brake System Bleeding Brakes https://automechanics.wordpress.com/category/brakes/ How a Car Works Brake Adjustment Explained http://www.howacarworks.com/brakes/adjusting-the-brakes</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>CCTC: TD-MTN 02.2, TD-MTN 02.3, TD-HSE 1.1, TD-HSE 1.3</p> <p>CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1</p>	<p>What specialty tools are needed to assess brake problems?</p>	<p>components and leaks</p> <ul style="list-style-type: none"> • Demonstrate diagnostic procedure for concealed problems or internal leaks • Demonstrate diagnostic procedures for poor stopping, break noise, pulling, grabbing, dragging and pedal pulsation • Test pressure differential valve according to repair manual • Test a proportioning valve according to instructions in proper repair manual • Test brake metering valve according to instructions in repair manual • 	<p>Lab #2 Given proper tools, equipment and repair manuals, diagnose a brake problem caused by a malfunctioning proportioning valve, metering valve or differential valve.</p>	

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>Remove and replace calipers and rotors, front and rear. Refinish rotors, on or off car. Clean, inspect and rebuild calipers.</p> <p>NJSLS: 9.3.12.TD.2, 9.3.12.TD.6, 9.3.12.TD□ MTN.1, 9.3.12.TD□ OPS.2</p> <p>CCTC: TD-MTN 02.1, TD-MTN 02.2, TD-MTN 02.3, TD-HSE 1.1</p> <p>CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1</p>	<p>What are the major components of the brake system? What are rotors, drums and calipers?</p> <p>How are brake components related? How are they diagnosed?</p> <p>What systems need maintenance in regards to Disc Brakes? Drum Brakes?</p> <p>How does the brake system affect safety?</p>	<ul style="list-style-type: none"> • Bleed the system • Properly fill master cylinder • Inspect pads for wear • Inspect rotor for wear or warpage • Adjust disc brakes • Inspect caliper for corrosion and leakage • Demonstrate use of dial indicator • Clean and inspect caliper mountings and slides for wear and damage; repair to specifications • Adjust calipers with integrated parking brake system • Demonstrate the proper use of a disc brake lathe • Describe the use of a special micrometer for measuring rotors • Demonstrate 	<p>Lab Given a vehicle needing a visual brake inspection, proper service manual and access to necessary tools and equipment, perform a visual inspection of all system components. Record findings for master cylinder reservoir fluid level, leaks, brake hose condition, brake lining condition and thickness, brake drum diameter and condition, brake rotor thickness, run out and parallelism, and brake pad thickness.</p> <p>Lab #2 Given a set of brake rotors needing machining, proper service manual and access to tools, equipment and materials, machine rotors. Machine</p>	<p>How a Car Works How the Braking System Works https://www.youtube.com/watch?v=nMQxqsyuJKE</p> <p>How a Car Works Bleeding the brakes http://www.howacarworks.com/brakes/bleeding-the-brakes</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
		<p>procedures for doing the task on a vehicle, if equipment is available</p> <ul style="list-style-type: none"> • Demonstrate use of bore or cylinder hone • Explain caution and careful inspection necessary in rebuilding a caliper cylinder • Demonstrate proper procedure in rebuilding caliper cylinder • Explain need for the cylinder dust boot 	<p>rotors to the tolerance allowed by the manufacturer, with surfaces parallel, no run out and a nondirectional, smooth surface finish.</p> <p>Checklist/Procedure Develop Checklist/Procedure outlining steps to assess Brake problems.</p>	
<p>Rebuild defective calipers. Replace drum brake shoes with proper materials. Refinish brake drums</p> <p>NJSLS: 9.3.12.TD.2, 9.3.12.TD.6, 9.3.12.TD□ MTN.1, 9.3.12.TD□ OPS.2</p> <p>CCTC: TD-MTN 02.1,</p>	<p>How do Drum Brakes function? What are its main components?</p> <p>What special tools are used in service of brake components? What math skills are used in determining surface refinishing?</p>	<ul style="list-style-type: none"> • Demonstrate use of special caliper tools • Demonstrate use of bore or cylinder hone • Explain caution and careful inspection necessary in rebuilding a caliper cylinder • Demonstrate proper 	<p>Lab Given a vehicle with a defective disc brake caliper, proper service manual and access to necessary tools and equipment, repair disc brake caliper. The caliper bore will be properly serviced, the piston seal and piston</p>	<p>How a Car Works Drum Brake Shoes Replacement http://www.howacarworks.com/brakes/renewing-drum-brake-shoes</p> <p>How a Car Works Looking for leaks in the brake system https://www.youtube.com</p>

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<p>TD-MTN 02.2, TD-MTN 02.3, TD-HSE 1.1</p> <p>CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1</p>	<p>What special fluids and lubricants are used in brake systems?</p>	<p>procedure in rebuilding caliper cylinder</p> <ul style="list-style-type: none"> • Demonstrate the proper use of a brake drum lathe • Demonstrate the use of a brake drum micrometer • Explain when proper cut on brake drum surface has been made • Demonstrate the proper use of a brake drum lathe • Demonstrate the use of a brake drum micrometer • Explain when proper cut on brake drum surface has been made 	<p>and dust seal properly installed and the machined surfaces of caliper properly serviced.</p> <p>Lab #2 Given a set of brake drums needing machining, service manual and access to necessary tools, equipment and materials, machine drums. The drums will be machined to a tolerance allowed by the manufacturer's specifications and D.O.T. regulations, and the surface will be smooth across the width.</p>	<p>/watch?v=4RRbFiro4ps</p>
<p>Bleed hydraulic brakes. Rebuild or replace wheel cylinder. Remove and replace/overhaul master</p>	<p>What are the primary differences between Drum Brakes and Disc Brakes?</p>	<ul style="list-style-type: none"> • Demonstrate proper use of bleeder tools and equipment • Explain brake pedal 	<p>Lab Given a vehicle needing the brakes bled, proper service manual and access to</p>	<p>How a Car Works Replacing a master cylinder and servo unit http://www.howacarworks.com/brakes/replacing-</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>cylinder.</p> <p>NJSLS: 9.3.12.TD.2, 9.3.12.TD.6, 9.3.12.TD□ MTN.1, 9.3.12.TD□ OPS.2</p> <p>CCTC: TD-MTN 02.1, TD-MTN 02.2, TD-MTN 02.3, TD-HSE 1.1</p> <p>CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1</p>	<p>How are brakes checked for wear? What are problems associated with brake wear?</p> <p>What safety precautions are necessary when replacing braking components?</p> <p>What special attention is given to disposal of brake fluid?</p>	<p>action when all air has been removed from the system</p> <ul style="list-style-type: none"> • Describe bleeding procedure for removal of air from brake system • Check master cylinder fluid level • Describe the safety procedures used to repair a cylinder • Explain how new parts are to be installed into cylinder • Demonstrate the use of brake cylinder hone to prepare cylinder for new parts • Demonstrate the use of special tools • Describe the need to hone the cylinder • Describe cleaning all parts and valves • Explain how new parts are installed, function of lock screw 	<p>necessary tools and equipment, bleed the brakes within twice the time allowed by the flat rate manual. All air from line will be removed and the pedal will be firm.</p> <p>Lab #2 Given a vehicle with a defective master cylinder, proper service manual and necessary tools, remove, rebuild, then replace master cylinder. Master cylinder must be rebuilt and installed according to manufacturer's procedures. All attaching hardware must be torqued to specifications, pedal must be firm and line connections must not leak.</p> <p>Presentation/Poster Utilizing choice of</p>	<p>a-master-cylinder-and-servo-unit</p> <p>How a Car Works Bleeding the brakes http://www.howacarworks.com/brakes/bleeding-the-brakes</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
		(if used) and snap rings <ul style="list-style-type: none"> • Explain the differences in master cylinders • Demonstrate bench bleeding a master cylinder • Measure and adjust rod length and check pedal height 	medium illustrate the difference between Drum and Disc Brakes.	
<p>Flush brake systems. Test and replace vacuum brake power unit and hydro-booster. Free up or replace parking brake cables and linkage.</p> <p>NJSLS: 9.3.12.TD.2, 9.3.12.TD.6, 9.3.12.TD□ MTN.1, 9.3.12.TD□ OPS.2</p> <p>CCTC: TD-MTN 02.1, TD-MTN 02.2, TD-MTN 02.3,TD-HSE 1.1</p> <p>CCSS: RL.9-10.1; RI.9-</p>	<p>What is the importance of hydraulic brake systems? What is their function? How do we ascertain their optimum functionality?</p> <p>What are the first signs of vacuum pressure in a brake system?</p> <p>What can happen if the vacuum power unit fails?</p> <p>What special safety equipment is used when flushing brake system?</p>	<ul style="list-style-type: none"> • Discuss handling of fluid (keeping out of eyes and off any painted surface) • Explain brake fluid grades or types • Demonstrate brake flushing at each wheel • Describe vacuum effect on unit • Remove and replace power lubricant • Demonstrate operation of power brake unit 	<p>Lab Given a vehicle with a defective brake power unit, proper service manual and access to necessary tools and equipment, test and replace vacuum brake power unit. Demonstrate that all vacuum connections are properly routed and connected and that brake pedal behavior reflects proper operation, with no vacuum or fluid leaks..</p>	<p>How a Car Works Replacing a drum-brake wheel cylinder http://www.howacarworks.com/brakes/replacing-a-drum-brake-wheel-cylinder</p> <p>How a Car Works Adjusting the handbrake http://www.howacarworks.com/brakes/adjusting-the-handbrake</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
10.5; SL.9-10.1		<ul style="list-style-type: none"> • Describe power steering pump pressure on the brake system • Remove and replace hydro-boost unit • Demonstrate proper operation of the hydro-boost unit • Explain how parking brakes operate • Explain how to free up binding cables • Demonstrate parking brake cable adjustment 	<p>Venn Diagram Illustrate the difference and similarities of Drum Brakes Systems and Disc Brakes systems.</p>	
<p>Test brake anti-lock system. Remove and replace defective anti-lock system components.</p> <p>NJSLS: 9.3.12.TD.2, 9.3.12.TD.6, 9.3.12.TD□ MTN.1, 9.3.12.TD□ OPS.2</p> <p>CCTC: TD-MTN 02.1, TD-MTN 02.2, TD-MTN</p>	<p>What are Antilock Brakes (ABS)? How do they function?</p> <p>Where are the Anti-lock Brake systems located? Why is maintenance important?</p> <p>What does ABS warning light signify? What is its</p>	<ul style="list-style-type: none"> • Identify which wheel has problems or other system defects • Explain the need for proper road check driving procedures • Describe possible malfunctions which would cause the ABS warning light to illuminate 	<p>Lab Given a vehicle needing the anti-lock system tested, road check the vehicle to determine the problem. No wheel will lock (skid) when brakes are firmly applied or otherwise deviate from manufacturer's specifications.</p>	<p>How a Car Works How ABS works http://www.howacarworks.com/technology/how-abs-works</p> <p>How a Car Works Checking the brake light circuit http://www.howacarworks.com/brakes/checking-the-brake-light-circuit</p>

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>02.3,TD-HSE 1.1</p> <p>CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1</p>	<p>function?</p>	<ul style="list-style-type: none"> • Interpret vehicle self diagnostics system signals and test equipment readouts to diagnose brake problems • Perform a fluid pressure diagnosis on the high pressure ABS • Service, test, and adjust ABS speed sensors following manufacturers recommended practices • Diagnose ABS braking problems caused by vehicle modifications (tire size, final drive ratio, etc.) • Remove and replace faulty components • Demonstrate proper function of anti-lock brake system 	<p>Art Project Poster illustrating a how an Anti-Lock Braking system functions.</p>	

Student Learning Objectives (SLOs)	Essential Questions	Skills & Indicators	Sample Activities	Resources
<p>Fabricate and install brake lines and hoses</p> <p>NJSLS: 9.3.12.TD.2, 9.3.12.TD.6, 9.3.12.TD.1, 9.3.12.TD.2</p> <p>CCTC: TD-MTN 02.1, TD-MTN 02.2, TD-MTN 02.3, TD-HSE 1.1</p> <p>CCSS: RL.9-10.1; RI.9-10.5; SL.9-10.1</p>	<p>What are materials used in the manufacturing of brake hoses?</p> <p>What special fittings are used? What special tools are used in making brake lines?</p> <p>What are signs that brake lines need to be replaced?</p>	<ul style="list-style-type: none"> • Demonstrate safety precautions when working on a brake system and depressurizing high pressure components • Inspect brake lines and hoses for leaks, dents, kinks, cracks, bulging, or wear; tighten loose fittings or supports • Fabricate and install brake lines (double flare and I.S.O. types) • Replace hoses, fittings, and supports as needed 	<p>Lab Given a vehicle with a damaged brake line, proper tools and equipment, repair or replace the brake line and hose.</p> <p>Poster Create poster or shop sign illustrating/diagraming a brake system.</p>	<p>How a Car Works Fitting new flexible brake hoses http://www.howacarworks.com/brakes/fitting-new-flexible-brake-hoses</p> <p>How a Car Works Fitting new metal brake pipes http://www.howacarworks.com/brakes/fitting-new-metal-brake-pipes</p>

Unit 4 Vocabulary

Pedal pulsation
Differential valve
Proportioning valve
Metering valve
Pedal reserve
Master cylinder
Reservoir fluid
Parallelism
Brake drum
Calipers
Master cylinder
Warpage
Dial indicator
Parking brake
Brake drums
Machining
Tolerance
Backing plate
Wheel bearings
Retaining hardware
Self adjusting brakes
Wheel cylinder

Brake bleeding
Hydraulic brakes
Vacuum
Hydro-booster
Anti-lock system (ABS)

Suggested Unit Projects

Choose At Least One

Writing Exercise

Write a safety pamphlet outlining a safety procedure in the Lab

Group Exercise

In a group create an action plan for improving safety in the Lab.

Suggested Structured Learning Experiences

Youth and Adult Automotive Training Center in Newark
 201 Bergen St, Newark, NJ 07103
[https://www.google.com/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8-q=Youth and Adult Automotive Training Center in Newark&tbs=lf:1,lf_ui:2&rflfq=1&rlha=0&rlag=40740789,-74189932,406&tbm=icl&rdimm=1045171484867486717](https://www.google.com/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8-q=Youth+and+Adult+Automotive+Training+Center+in+Newark&tbs=lf:1,lf_ui:2&rflfq=1&rlha=0&rlag=40740789,-74189932,406&tbm=icl&rdimm=1045171484867486717)

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

Vintage Automobile Museum of New Jersey
 1800 Bay Ave. Building #13
 Point Pleasant, NJ
 Phone: 732-899-0012
<http://www.vintageautomuseum.org/>