



El Camino College  
COURSE OUTLINE OF RECORD – Official

<b>Course Acronym:</b>	NATE
<b>Course Number:</b>	2
<b>Descriptive Title:</b>	Maintenance and Light Repair (MLR) 2
<b>Division:</b>	Industry and Technology
<b>Department:</b>	Automotive Technology
<b>Course Disciplines:</b>	Automotive Technology
<b>Catalog Description:</b>	<p>This noncredit course is designed to prepare students for entry-level employment in Vehicle Maintenance and Light Repair (MLR) as identified by the Automotive Service Excellence (ASE) Auto Maintenance and Light Repair Test Area G1. The principles of brakes, steering, suspension, electrical, heating and air conditioning are essential components in automotive practices and are vital topics in preparing students for the ASE G1 testing requirements.</p> <p><i>Note: This is the second of two courses required for ASE G1 Testing.</i></p>
<b>Prerequisite:</b>	NATE 1
<b>Co-requisite:</b>	
<b>Recommended Preparation:</b>	
<b>Enrollment Limitation:</b>	
<b>Hours Lecture (per week):</b>	18
<b>Hours Laboratory (per week):</b>	81
<b>Outside Study Hours:</b>	2
<b>Total Course Hours:</b>	99
<b>Course Units:</b>	0
<b>Grading Method:</b>	Pass/No Pass only
<b>Credit Status:</b>	Non Credit
<b>Transfer CSU:</b>	No
<b>Effective Date:</b>	
<b>Transfer UC:</b>	No
<b>Effective Date:</b>	
<b>General Education:</b>	ECC
<b>Term:</b>	

<b>Other:</b>	
<b>CSU GE:</b>	
<b>Term:</b>	
<b>Other:</b>	
<b>IGETC:</b>	
<b>Term:</b>	
<b>Other:</b>	
<b>Student Learning Outcomes:</b>	<p><b>SLO #1 Safety</b></p> <p>Recognize and identify shop safety, environmental hazards and sustainable environmental practices in an automotive shop.</p> <p><b>SLO #2 Basic Skills</b></p> <p>Develop the skills needed to perform maintenance and light repairs on brakes, steering, suspension, electrical, heating and air conditioning systems.</p> <p><b>SLO #3 Research</b></p> <p>Perform basic maintenance according to research on proper safety precautions, established maintenance scheduling, accurate inspection processes and repair procedures resulting in efficient repairs.</p>
<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. Comply with shop and vehicle safety practices established by Laboratory policies.</li> <li>2. Perform basic maintenance related to brakes, steering, suspension, electrical, heating and air conditioning as defined by ASE G1 testing requirements.</li> <li>3. Describe various employment opportunities available in the automotive industry.</li> <li>4. Evaluate the cause of the complaint and determine the corrective action needed that complies with industry standards and manufacturer's specifications as described by the course content.</li> <li>5. Understand the various fluid level check points, fluid characteristics and filling procedure for each fluid for multiple automotive systems as described by the course content.</li> <li>6. Perform multipoint vehicle inspection, identifying and documenting various maintenance components and systems as described by the course content.</li> <li>7. Identify damaged, defective, or inoperable components while performing the comprehensive "3 C's" (Complaint, Cause, Correction) as described by the course content.</li> <li>8. Follow preventive maintenance schedule as defined by the manufacturer, based on the type of driving done as described by the course content.</li> <li>9. Accurately document repairs and maintenance procedures using the "3 C's" on a service repair order as described by the course content.</li> <li>10. Recognize maintenance indicators used for various systems by different manufacturers and research how to properly reset maintenance indicators based on various factors as described by the course content.</li> </ol>

	<p>11. Provide a representative assessment method for each from this list. If you select "other" give an explanation.</p>
<p><b>Major Topics:</b></p>	<p><b>I. Overview, Safety, and Industry (1 hour, lecture)</b></p> <ul style="list-style-type: none"> <li>A. Course requirements and policies</li> <li>B. Safety information and test</li> <li>C. Safety and Pollution Prevention (SP2)</li> <li>D. Tools equipment and usage</li> <li>E. Occupational Safety and Health Administration (OSHA)</li> <li>F. Industry employment opportunities</li> <li>G. Automotive Service Excellence (ASE) exams</li> </ul> <p><b>II. Research, Measurement and Documentation (.5 hour, lecture)</b></p> <ul style="list-style-type: none"> <li>A. Legal rights and responsibilities</li> <li>B. Service information</li> <li>C. 3 C's</li> <li>D. Measurement; tools, systems and math</li> </ul> <p><b>III. Disc Brakes (1.5 hours, lecture)</b></p> <ul style="list-style-type: none"> <li>A. Operation</li> <li>B. Caliper assembly mountings and slides inspect</li> <li>C. Pads and retaining hardware service and lubricate</li> <li>D. Rotors clean, inspect, measure and service</li> <li>E. Determining to machine or replace rotors</li> <li>F. Machine rotors on and off car</li> <li>G. Integral parking brake caliper service and adjust</li> <li>H. Wheel lug nuts torque</li> <li>I. Fill master cylinder</li> <li>J. Road test and burnish break-in pads</li> </ul> <p><b>IV. Drum Brakes (1.5 hours, lecture)</b></p> <ul style="list-style-type: none"> <li>A. Operation</li> <li>B. Servicing, inspecting and lubricating brake shoes and related hardware</li> <li>C. Wheel cylinder inspection and service</li> <li>D. Inspecting and measuring brake drums</li> <li>E. Determining to machine or replace</li> <li>F. Machining drums</li> <li>G. Adjusting brake shoes and parking brake</li> <li>H. Inspecting, lubricating and adjusting parking brake cables</li> </ul> <p><b>V. Steering (1 hour, lecture)</b></p> <ul style="list-style-type: none"> <li>A. System types electric or hydraulic and operation</li> <li>B. Power steering fluid inspection and leakage</li> <li>C. Pump belt and pulley alignment</li> <li>D. Pump noises, vibration and leakage</li> <li>E. Removing and replacing pump and mounting hardware</li> <li>F. Power steering hoses, coolers and filters</li> </ul>

- G. Rack and pinion steering gear inspect and replace boot/bellows
- H. Flush, fill and bleed power steering

**VI. Steering Linkage (1 hour, lecture)**

- A. Operation and components
- B. Pitman arm, center link, idler arm inspection and service
- C. Tie rods, sleeves, clamps, rod ends inspection and service
- D. Steering linkage damper inspection and service

**VII. Front Suspension (2 hours, lecture)**

- A. System overview
- B. Noises, handling, ride height and ride quality
- C. Control arms, bushings, rebound and jounce bumpers and shafts inspection
- D. Upper and lower ball joints, steering knuckle, spindle and steering arms
- E. Coil, leaf, torsion, air springs and related hardware
- F. Stabilizer bar bushings and links inspect and service
- G. Strut assembly, strut rods, radius arms and bushings inspection
- H. Wheel bearings hub assemblies noise and service

**VIII. Rear Suspension (2 hours, lecture)**

- A. System overview
- B. Noises, handling and ride height
- C. Coil, air, leaf springs, insulators and related hardware inspection
- D. Lateral links, trailing arms, sway bars, bushings and links
- E. Strut assembly and upper mount assembly
- F. Non-independent rear axle assembly and misalignment
- G. Tie rod and toe linkages, rear ball joints, knuckle and spindle
- H. Shock absorbers inspection and service
- I. Wheel bearings, seals and hub assemblies

**IX. Introduction to Electrical (2 hours, lecture)**

- A. Basic wire drawings
- B. Ohms law volts, ohms and amps
- C. Basic circuit defects
- D. Kirchoff's law voltage drop

**X. Batteries (1 hour, lecture)**

- A. Operation and types
- B. Load and capacitance testing
- C. Maintaining and restoring electronic memory functions
- D. Inspect, service or replace
- E. Slow or fast charging
- F. Cables, connectors, clamps and hold downs
- G. Jumpstarting a vehicle

**XI. Starters (1 hour, lecture)**

- A. Operation
- B. Current draw test
- C. Starter control circuit components
- D. Removing and replacing starter

**XII. Alternators (1 hour, lecture)**

- A. Operation
- B. Charging system output testing.
- C. Inspecting, adjusting and replacing drive belts, pulleys and tensioners
- D. Removing, inspecting and replacing alternator

**XIII. Electrical Accessories (1 hour, lecture)**

- A. Headlights and auxiliary lights adjustment and service
- B. Interior and exterior lamps and sockets service
- C. Lenses inspection and service
- D. Instrument, gauges and warning light operation verification
- E. Resetting maintenance indicators
- F. Horn operation
- G. Wiper motor, blades and washer pump
- H. Air bag safety

**XIV. Heating, Ventilation and Air Conditioning (HVAC) (1.5 hours, lecture)**

- A. Verifying HVAC basic operation and components
- B. Identifying Air Conditioning (A/C) refrigerant
- C. Recovery and recharge environment responsibility
- D. Leak checking A/C components
- E. A/C condenser restricted air flow
- F. Cabin air filter
- G. Drive belt wear, tension, adjustments and alignment
- H. Evaporator drains

**XV. Defined by Lecture Topics (81 hours, lab)**

- A. Overview, safety, education and Industry
- B. Research, measurement and documentation
- C. Disc brakes
- D. Drum brakes
- E. Steering
- F. Steering linkage
- G. Front suspension
- H. Rear suspension
- I. Introduction to electrical
- J. Batteries
- K. Starters
- L. Alternators
- M. Electrical accessories
- N. HVAC

<b>Total Lecture Hours:</b>	18
<b>Total Laboratory Hours:</b>	81
<b>Total Hours:</b>	99
<b>Primary Method of Evaluation:</b>	3) Skills demonstration
<b>Typical Assignment Using Primary Method of Evaluation:</b>	Complete a 7-10 page worksheet packet that covers specific tasks for Automotive Service Excellence (ASE) G1 as defined by course outline. Submit worksheet packet to the instructor.
<b>Critical Thinking Assignment 1:</b>	Internet research at manufacturer or industry websites; exploring the various jobs available in the automotive industry. Document the various local employment opportunities through a two-page report submitted to the instructor and evaluated by rubric.
<b>Critical Thinking Assignment 2:</b>	Using published service information, demonstrate the correct technique for performing automotive routine maintenance services, observed and graded by instructor.
<b>Other Evaluation Methods:</b>	Class Performance Completion Homework Problems Journal kept throughout course Laboratory Reports Matching Items Multiple Choice Objective Exam Performance Exams Term or Other Papers Written Homework
<b>Instructional Methods:</b>	Demonstration Discussion Field Trips Group Activities Guest Speaker Lab Lecture Multimedia Presentations Role Play/Simulation
<b>If other:</b>	
<b>Work Outside of Class:</b>	Answer questions Journal (done on a continuing basis throughout the semester) Observation of or participation in an activity related to course content (such as theatre event, museum, concert, debate, meeting) Problem solving activity Required reading Skill practice Study Written work (such as essay/composition/report/analysis/research)
<b>If Other:</b>	

<b>Up-To-Date Representative Textbooks:</b>	James Halderman, <u>Automotive Technology: Principles, Diagnosis, and Service</u> , 6th Edition, Pearson Education, 2020
<b>Alternative Textbooks:</b>	
<b>Required Supplementary Readings:</b>	
<b>Other Required Materials:</b>	Safety Glasses meeting American National Standards Institute (ANSI) 87 Appropriate shop apparel consider suitable by instructor
<b>Requisite:</b>	Prerequisite
<b>Category:</b>	sequential
<b>Requisite course(s): List both prerequisites and corequisites in this box.</b>	NATE 1
<b>Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).</b>	<b>Understand automotive safety practices.</b> NATE 1 - Comply with shop and vehicle safety practices established by laboratory policies. Ability to perform light repair to automotive engines, automatic transmissions, drive trains, axles and brakes. NATE 1 - Perform basic maintenance related to engines, automatic transmissions, manual drive trains, axles and brakes as defined by ASE G1 testing requirements.
<b>Requisite Skill:</b>	
<b>Requisite Skill and Matching Skill(s): Bold the requisite skill(s). If applicable</b>	
<b>Requisite course:</b>	
<b>Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).</b>	
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<b>Enrollment Limitations and Category:</b>	

<b>Enrollment Limitations Impact:</b>	
<b>Course Created by:</b>	Edward Matykiewicz
<b>Date:</b>	04/03/2019
<b>Original Board Approval Date:</b>	
<b>Last Reviewed and/or Revised by:</b>	Edward Matykiewicz
<b>Date:</b>	03/08/2022
<b>Last Board Approval Date:</b>	11/21/2022