

El Camino College COURSE OUTLINE OF RECORD – Approved

## I. GENERAL COURSE INFORMATION

Subject and Number:	Noncredit Automotive Technology 2
Descriptive Title:	Maintenance and Light Repair (MLR) 2
<b>Course Disciplines:</b>	Automotive Technology
Division:	Industry and Technology

## **Catalog Description:**

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.

Note: This is the second of two courses required for ASE G1 Testing.

## **Conditions of Enrollment:**

Pass NATE 1

Course Length:	X Full Term 🛛 Other (specify number of weeks):
Hours Lecture:	1.00 hours per week TBA
Hours Laboratory:	4.5 hours per week TBA
Course Units:	0
Total hours:	99
Grading Method:	Pass/No Pass
Credit Status:	Non-Credit
Transfer CSU:	No
Transfer UC:	No

II. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

#### II. OUTCOMES AND OBJECTIVES

A. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)

Upon successful completion of this course, students will be able to:

**Safety** Recognize and identify shop safety, environmental hazards and sustainable environmental practices in an automotive shop.

**Basic Skills** Develop the skills needed to perform maintenance and light repairs on brakes, steering, suspension, electrical, heating and air conditioning systems.

**Research** Perform basic maintenance according to research on proper safety precautions, established maintenance scheduling, accurate inspection processes and repair procedures resulting in efficient repairs.

## B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)

- 1. Comply with shop and vehicle safety practices established by Laboratory policies. Multiple Choice Exams
- Perform basic maintenance related to brakes, steering, suspension, electrical, heating and air conditioning as defined by ASE G1 testing requirements. Laboratory reports
- 3. Describe various employment opportunities available in the automotive industry Written homework
- 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. Performance exams
- 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. Multiple Choice Exams
- Perform multipoint vehicle inspection, identifying and documenting various maintenance components and systems as described by the course content. Class Performance

- Identify damaged, defective, or inoperable components while performing the comprehensive "3 C's" (Complaint, Cause, Correction) as described by the course content. Quizzes
- Follow preventive maintenance schedule as defined by the manufacturer, based on the type of driving done as described by the course content.
   Written homework
- Accurately document repairs and maintenance procedures using the "3 C's" on a service repair order as described by the course content. Laboratory reports
- 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.

Multiple Choice Exams

III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)

Lecture	1	I	Overview, Safety, and Industry
			A. Course requirements and policies
			B. Safety information and test
			C. Safety and Pollution Prevention (SP2)
			D. Tools equipment and usage
			E. Occupational Safety and Health Administration (OSHA)
			F. Industry employment opportunities
			G. Automotive Service Excellence (ASE) exams
Lecture	.5	II	Research, Measurement and Documentation
			A. Legal rights and responsibilities
			B. Service information
			C. 3 C's
			D. Measurement; tools, systems and math
Lecture	1.5	111	Disc Brakes
			A. Operation
			B. Caliper assembly mountings and slides inspect
			C. Pads and retaining hardware service and lubricate
			D. Rotors clean, inspect, measure and service
			E. Determining to machine or replace rotors
			F. Machine rotors on and off car
			G. Integral parking brake caliper service and adjust
			H. Wheel lug nuts torque
			I. Fill master cylinder
			J. Road test and burnish break-in pads
Lecture	1.5	IV	Drum Brakes
			A. Operation
			B. Servicing, inspecting and lubricating brake shoes and related
			hardware
			C. Wheel cylinder inspection and service
			D. Inspecting and measuring brake drums
			E. Determining to machine or replace
			F. Machining drums
			G. Adjusting brake shoes and parking brake
			H. Inspecting, lubricating and adjusting parking brake cables
Lecture	1		Steering

			A System types electric or hydraulic and operation
			B Power steering fluid inspection and leakage
			C Pump helt and nulley alignment
			D. Dump poices vibration and lookage
			D. Fullip hoises, vibration and reakage
			E. Removing and replacing pump and mounting naroware
			F. Power steering noses, coolers and filters
			G. Rack and pinion steering gear inspect and replace
			boot/bellows
			H. Flush, fill and bleed power steering
Lecture	1		Steering Linkage
			A. Operation and components
			B. Pitman arm, center link, idler arm inspection and service
			C. The rods, sleeves, clamps, rod ends inspection and service
			D. Steering linkage damper inspection and service
Lecture	2		Front Suspension
			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
Lecture	2		Rear Suspension
			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
			F Strut assembly and upper mount assembly
			E. Non-independent rear axle assembly and misalignment
			G Tie rod and toe linkages rear ball joints knuckle and snindle
			U. The foul and toe linkages, real ball joints, knuckle and spinule
			H. Shock absorbers hispection and service
Locturo	2	VII	I. Wheel bearings, seals and hub assemblies
Lecture	2	VII	A Basic wire drawings
			A. Dasic wire drawings
			B. Olillis law volts, olillis allu allips
			C. Basic circuit defects
Lastura	1		D. KITCHOH STAW VOILAge Grop
Lecture	1	VIII	A Operation and types
			A. Operation and types
			D. Lodu dilu capacitance testing
			<ul> <li>Invitaining and restoring electronic memory functions</li> </ul>
			D. Inspect, service or replace
			E. Slow or fast charging
			F. Cables, connectors, clamps and hold downs
L			G. Jumpstarting a vehicle
Lecture	1	IX	ptarters
			A. Operation
			B. Current draw test
			C. Starter control circuit components
			D. Removing and replacing starter
Lecture	1	X	Alternators
			A. Operation
	1		B. Charging system output testing.

			С.	Inspecting, adjusting and replacing drive belts, pulleys and
				tensioners
			D.	Removing, inspecting and replacing alternator
Lecture	1	XI	Electrica	al Accessories
			Α.	Headlights and auxiliary lights adjustment and service
			В.	Interior and exterior lamps and sockets service
			С.	Lenses inspection and service
			D.	Instrument, gauges and warning light operation verification
			Ε.	Resetting maintenance indicators
			F.	Horn operation
			G.	Wiper motor, blades and washer pump
			Н.	Air bag safety
Lecture	1.5	XII	Heatin	g, Ventilation and Air Conditioning (HVAC)
			Α.	Verifying Heating, Ventilation and Air Conditioning (HVAC)
				basic operation and components
			В.	Identifying Air Conditioning (A/C) refrigerant
			C.	Recovery and recharge environment responsibility
			D.	Leak checking A/C components
			Ε.	A/C condenser restricted air flow
			F.	Cabin air filter
			G.	Drive belt wear, tension, adjustments and alignment
			H.	Evaporator drains
Lab	81	XIV	Defined	by Lecture Topics
			А.	Overview, safety, education and Industry
			В.	Research, measurement and documentation
			C.	Disc brakes
			D.	Drum brakes
			Ε.	Steering
			F.	Steering linkage
			G.	Front suspension
			Н.	Rear suspension
			Ι.	Introduction to electrical
			J.	Batteries
			К.	Starters
			L.	Alternators
			М.	Electrical accessories
			Ν.	HVAC
Total Lecture Hours		18		
Total Laboratory Hours		81		
Total Hours	•		99	

## IV. PRIMARY METHODS OF EVALUATION AND SAMPLE ASSIGNMENTS

#### A. PRIMARY METHOD OF EVALUATION

Problem solving demonstrations (computational or non-computational) Skills demonstrations

## **B. TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION**

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.

#### C. COLLEGE LEVEL CRITICAL THINKING ASSIGNMENTS

- 1. 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.
- 2. Using published service information, demonstrate the correct technique for performing automotive routine maintenance services, observed and graded by instructor.

#### D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:

Class Performance Objective Exam Completion Performance Exams Quizzes Homework Problems Journal kept throughout course Term or Other Papers Laboratory Reports True/False Matching Items Written Homework Multiple Choice

#### V. INSTRUCTIONAL METHODS: Select from this list.

Lecture Group Activities Lab Role play/simulation Discussion Guest Speakers Multimedia presentations Field trips Demonstration

Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instructional delivery shall provide access, full inclusion, and effective communication for students with disabilities.

## VI. WORK OUTSIDE OF CLASS:

Study
Answer questions
Skill practice
Required reading
Problem solving activity
Written work (such as essay/composition/report/analysis/research)
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)

#### Estimated Study Hours Per Week: 2 hours

#### **VII. TEXTS AND MATERIALS**

#### A. UP-TO-DATE REPRESENTATIVE TEXTBOOKS

Automotive Technology: Principles, Diagnosis, and Service (6th Edition), James Halderman, Pearson Education, 2019

#### **B. ALTERNATIVE TEXTBOOKS**

#### C. REQUIRED SUPPLEMENTARY READINGS

### D. OTHER REQUIRED MATERIALS

Safety Glasses meeting American National Standards Institute (ANSI) 87 Appropriate shop apparel consider suitable by instructor

#### VIII. CONDITIONS OF ENROLLMENT

A. Requisite/s (Course and Non-Course Prerequisite/s and Corequisite/s).

Requisites	Category and Justification
NATE 1	Sequential classes for basic knowledge and stackable offering

B. Requisite Skills - Match skills from prerequisite course/s or non-course prerequisites without which a student would be "highly unlikely to succeed."

Non Course Prerequisite			
Understand automotive safety practices.			
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.			

C. Recommended Preparations (Course and Non-Course) Add rows as needed.

Recommended Preparation	Category and Justification
None	

# D. Recommended Skills. Match skills from recommended courses or non-course prerequisite that would "enhance a students' ability to succeed in the courses".

Recommended Skills – Matching
Recommended Skill Needed:
Course title and number and objective related to that skill:

#### E. Enrollment Limitations

Enrollment Limitations and Category	Enrollment Limitations Impact
None	

## Course created by: EDWARD MATYKIEWICZ

BOARD APPROVAL DATE: 10/21/2019

LAST BOARD APPROVAL DATE:

Last Reviewed and/or Revised by