

**Transportation, Distribution and Logistics Career Cluster  
Maintenance and Light Repair 3  
Course Number 47.53310**

**Course Description:**

Students will learn the basic skills needed to gain employment as a maintenance and light repair technician and will expose student to automotive preventative maintenance and servicing, replacing brakes, as well as steering and suspension components. Students will learn about general electrical system diagnosis, electrical theory, basic tests that are required, and determine the necessary action. In addition, students will learn how to evacuate and recharge air-conditioning systems using the proper refrigerant. The standards in this course are aligned with ASE/NATEF standards and are an excellent foundation for the entry-level technician. The prerequisite for this course is Maintenance and Light Repair 2.

**Course Standard 1**

**TDL-MLR3-1**

The following standard is included in all CTAE courses adopted for the Career Cluster/Pathways. Teachers should incorporate the elements of this standard into lesson plans during the course. The topics listed for each element of the standard may be addressed in differentiated instruction matching the content of each course. These elements may also be addressed with specific lessons from a variety of resources. This content is not to be treated as a unit or separate body of knowledge but rather integrated into class activities as applications of the concept.

**Standard: Demonstrate employability skills required by business and industry.**

The following elements should be integrated throughout the content of this course.

**1.1 Communicate effectively through writing, speaking, listening, reading, and interpersonal abilities.**

Person-to-Person Etiquette	Telephone and Email Etiquette	Cell Phone and Internet Etiquette	Communicating At Work	Listening
Interacting with Your Boss	Telephone Conversations	Using Blogs	Improving Communication Skills	Reasons, Benefits, and Barriers
Interacting with Subordinates	Barriers to Phone conversations	Using Social Media	Effective Oral Communication	Listening Strategies
Interacting with Co-workers	Making and Returning Calls		Effective Written Communication	Ways We Filter What We Hear
Interacting with Suppliers	Making Cold Calls		Effective Nonverbal Skills	Developing a Listening Attitude
	Handling Conference Calls		Effective Word Use	Show You Are Listening
	Handling Unsolicited Calls		Giving and Receiving Feedback	Asking Questions
				Obtaining Feedback
				Getting Others to Listen

Nonverbal Communication	Written Communication	Speaking	Applications and Effective Résumés
Communicating Nonverbally	Writing Documents	Using Language Carefully	Completing a Job Application
Reading Body Language and mixed Messages	Constructive Criticism in Writing	One-on-One Conversations	Writing a Cover Letter
Matching Verbal and Nonverbal communication		Small Group Communication	Things to Include in a Résumé

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Improving Nonverbal Indicators		Large Group Communication	Selling Yourself in a Résumé
Nonverbal Feedback		Making Speeches	Terms to Use in a Résumé
Showing Confidence Nonverbally		Involving the Audience	Describing Your Job Strengths
Showing Assertiveness		Answering Questions	Organizing Your Résumé
		Visual and Media Aids	Writing an Electronic Résumé
		Errors in Presentation	Dressing Up Your Résumé

### 1.2 Demonstrate creativity by asking challenging questions and applying innovative procedures and methods.

Teamwork and Problem Solving	Meeting Etiquette
Thinking Creatively	Preparation and Participation in Meetings
Taking Risks	Conducting Two-Person or Large Group Meetings
Building Team Communication	Inviting and Introducing Speakers
	Facilitating Discussions and Closing
	Preparing Visual Aids
	Virtual Meetings

### 1.3 Exhibit critical thinking and problem solving skills to locate, analyze and apply information in career planning and employment situations.

Problem Solving	Customer Service	The Application Process	Interviewing Skills	Finding the Right Job
Transferable Job Skills	Gaining Trust and Interacting with Customers	Providing Information, Accuracy and Double Checking	Preparing for an Interview	Locating Jobs and Networking
Becoming a Problem Solver	Learning and Giving Customers What They Want	Online Application Process	Questions to Ask in an Interview	Job Shopping Online
Identifying a Problem	Keeping Customers Coming Back	Following Up After Submitting an Application	Things to Include in a Career Portfolio	Job Search Websites
Becoming a Critical Thinker	Seeing the Customer's Point	Effective Résumés:	Traits Employers are Seeking	Participation in Job Fairs
Managing	Selling Yourself and the Company	Matching Your Talents to a Job	Considerations Before Taking a Job	Searching the Classified Ads
	Handling Customer Complaints	When a Résumé Should be Used		Using Employment Agencies
	Strategies for Customer Service			Landing an Internship
				Staying Motivated to Search

### 1.4 Model work readiness traits required for success in the workplace including integrity, honesty, accountability, punctuality, time management, and respect for diversity.

Workplace Ethics	Personal Characteristics	Employer Expectations	Business Etiquette	Communicating at Work
Demonstrating Good Work Ethic	Demonstrating a Good Attitude	Behaviors Employers Expect	Language and Behavior	Handling Anger
Behaving Appropriately	Gaining and Showing Respect	Objectionable Behaviors	Keeping Information Confidential	Dealing with Difficult Coworkers
Maintaining Honesty	Demonstrating Responsibility	Establishing Credibility	Avoiding Gossip	Dealing with a Difficult Boss

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Playing Fair	Showing Dependability	Demonstrating Your Skills	Appropriate Work Email	Dealing with Difficult Customers
Using Ethical Language	Being Courteous	Building Work Relationships	Cell Phone Etiquette	Dealing with Conflict
Showing Responsibility	Gaining Coworkers' Trust		Appropriate Work Texting	
Reducing Harassment	Persevering		Understanding Copyright	
Respecting Diversity	Handling Criticism		Social Networking	
Making Truthfulness a Habit	Showing Professionalism			
Leaving a Job Ethically				

### 1.5 Apply the appropriate skill sets to be productive in a changing, technological, diverse workplace to be able to work independently and apply team work skills.

Expected Work Traits	Teamwork	Time Management
Demonstrating Responsibility	Teamwork Skills	Managing Time
Dealing with Information Overload	Reasons Companies Use Teams	Putting First Things First
Transferable Job Skills	Decisions Teams Make	Juggling Many Priorities
Managing Change	Team Responsibilities	Overcoming Procrastination
Adopting a New Technology	Problems That Affect Teams	Organizing Workspace and Tasks
	Expressing Yourself on a Team	Staying Organized
	Giving and Receiving Constructive Criticism	Finding More Time
		Managing Projects
		Prioritizing Personal and Work Life

### 1.6 Present a professional image through appearance, behavior and language.

On-the-Job Etiquette	Person-to-Person Etiquette	Communication Etiquette	Presenting Yourself
Using Professional Manners	Meeting Business Acquaintances	Creating a Good Impression	Looking Professional
Introducing People	Meeting People for the First Time	Keeping Phone Calls Professional	Dressing for Success
Appropriate Dress	Showing Politeness	Proper Use of Work Email	Showing a Professional Attitude
Business Meal Functions		Proper Use of Cell Phone	Using Good Posture
Behavior at Work Parties		Proper Use in Texting	Presenting Yourself to Associates
Behavior at Conventions			Accepting Criticism
International Etiquette			Demonstrating Leadership
Cross-Cultural Etiquette			
Working in a Cubicle			

### Support of CTAE Foundation Course Standards and Georgia Standards of Excellence L9-10RST 1-10 and L9-10WHST 1-10:

Georgia Standards of Excellence ELA/Literacy standards have been written specifically for technical subjects and have been adopted as part of the official standards for all CTAE courses.

## Course Standard 2

### TDL-MLR3-2

#### Identify and use safety procedures and proper tools.

- 2.1 Identify and use general shop safety rules and procedures.
- 2.2 Identify and use safe procedures for handling of tools and equipment.
- 2.3 Identify and use proper placement of floor jacks and jack stands.
- 2.4 Identify and use proper procedures for safe lift operation.
- 2.5 Identify and use proper ventilation procedures for working within the lab/shop area.
- 2.6 Identify and use marked safety areas.
- 2.7 Identify and demonstrate knowledge of the location and procedures for use of fire extinguishers and other fire safety equipment.
- 2.8 Identify and describe the location and use of eye wash stations.
- 2.9 Identify and describe the location of the posted evacuation routes.
- 2.10 Demonstrate compliance with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
- 2.11 Identify and wear appropriate clothing for lab/shop activities.
- 2.12 Identify and demonstrate securing hair and jewelry for lab/shop activities.
- 2.13 Identify and demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
- 2.14 Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
- 2.15 Locate and demonstrate use of material safety data sheets (MSDS).

## Course Standard 3

### TDL-MLR3-3

#### Identify and utilize proper tools and equipment tools and equipment.

- 3.1 Identify and use tools in automotive applications.
- 3.2 Identify and use standard and metric designations.
- 3.3 Demonstrate safe handling and use of appropriate tools.
- 3.4 Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
- 3.5 Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, and dial-caliper).

## Course Standard 4

### TDL-MLR3-4

#### Identify and utilize vehicle service information.

- 4.1 Identify and use information needed and the service requested on a vehicle service repair order.
- 4.2 Identify the purpose and demonstrate proper use of fender covers, mats.
- 4.3 Demonstrate use of the three C's (concern, cause, and correction) for vehicle service information.
- 4.4 Complete a work order that includes customer information, vehicle identifying information, customer concern, related service history, cause, and correction.
- 4.2 Identify the proper procedure to ensure that a vehicle is prepared to return to the customer per school/company policy (floor mats, steering wheel cover, etc.).

## Course Standard 5

### TDL-MLR3-5

#### **Demonstrate general engine service techniques (engine repair general).**

- 5.1 Demonstrate removing and replacing timing belts and verify correct camshaft timing. [NATEF I-A-5]
- 5.2 Identify and verify hybrid vehicle internal combustion engine service precautions. [NATEF I-A-7]
- 5.2 Demonstrate and verify adjusting valves (mechanical or hydraulic lifters) related to the cylinder head and valve train. [NATEF I-B-1]

## Course Standard 6

### TDL-MLR3-6

#### **Perform general automatic transmission & manual transaxle & differential service.**

- 6.1 Inspect and perform adjustments and replacements of external manual valve shift linkage, transmission range sensor/switch, and park/neutral position switches. [NATEF II-B-1]
- 6.2 Describe and perform adjustments and replacements related to the operational characteristics of a continuously variable transmission. [NATEF II-C-1]
- 6.3 Describe and perform adjustments and replacements related to operational characteristics of an electronically-controlled manual transmission/transaxle. [NATEF III-C-1]
- 6.4 Inspect and perform adjustments and replacements for front wheel drive (FWD) bearings, hubs, and seals. [NATEF III-D-1]
- 6.5 Inspect and perform adjustments and replacements for shafts, yokes, boots, and universal/CV joints. [NATEF III-D-2]
- 6.5 Inspect and perform adjustments and replacements for drive axle wheel studs. [NATEF III-F-1]
- 6.6 Inspect and perform adjustments and replacements for front-wheel bearings and locking hubs. [NATEF III-F-1]

## Course Standard 7

### TDL-MLR3-7

#### **Prepare vehicle for general suspension and steering systems service.**

- 7.1 Inspect and prepare power steering hoses and fittings. [NATEF IV-B-6]
- 7.2 Inspect and prepare the strut cartridge or assembly. [NATEF IV-B-16]
- 7.3 Inspect and prepare the front strut bearing and mount. [NATEF IV-B-17]
- 7.4 Inspect and prepare the rear suspension system leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins/bolts, and mounts. [NATEF IV-B-19]
- 7.5 Inspect and prepare the electric power-assisted steering. [NATEF IV-B-21]
- 7.6 Identify and prepare hybrid vehicle power steering system electrical circuits and safety precautions. [NATEF IV-B-22]

## Course Standard 8

### TDL-MLR3-8

#### **Perform hydraulic brake system service and repairs.**

- 8.1 Determine necessary action required after measuring brake pedal height, travel, and free play (as applicable). [NATEF V-B-1]
- 8.2 Check brake pedal travel, with and without the engine running to and verify proper power booster operation. [NATEF V-E-1]
- 8.3 Identify and verify traction control/vehicle stability control system components. [NATEF V-G-1]
- 8.4 Analyze the operation of a regenerative braking system. [NATEF V-G-2]

## Course Standard 9

### TDL-MLR3-9

#### Perform general electrical systems service.

- 9.1 Perform and use wiring diagrams to trace electrical/electronic circuits. [NATEF VI-A-3]
- 9.2 Demonstrate the proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance. [NATEF VI-A-4]
- 9.3 Demonstrate and summarize causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. [NATEF VI-A-5]
- 9.4 Describe and verify the operation of electrical circuits. [NATEF VI-A-6]
- 9.5 Describe and verify the operation of electrical circuits with fused jumper wires. [NATEF VI-A-7]
- 9.6 Describe and measure key-off battery drain (parasitic draw). [NATEF VI-A-8]
- 9.7 Demonstrate the proper procedure to replace electrical connectors and terminal ends. [NATEF VI-A-11]
- 9.8 Identify and test procedures of the hybrid vehicle auxiliary (12v) battery service, including repair, and test procedures. [NATEF VI-B-9]
- 9.9 Determine necessary action required after inspecting and testing starter relays and solenoids. [NATEF VI-C-3]
- 9.10 Demonstrate the proper procedure to remove and install a starter in a vehicle. [NATEF VI-C-4]
- 9.11 Determine necessary action required after inspecting and testing switches, connectors, and wires of starter control circuits. [NATEF VI-C-5]
- 9.12 Demonstrate the proper procedure to remove, inspect, and re-install a generator (alternator). [NATEF VI-D-3]
- 9.13 Demonstrate the proper procedure to aim headlights. [NATEF VI-E-2]
- 9.14 Describe system voltage and safety precautions associated with high-intensity discharge headlights. [NATEF VI-E-3]
- 9.15 Demonstrate the proper procedure to remove and reinstall a door panel. [NATEF VI-F-2]
- 9.16 Describe the proper operation of keyless entry/remote-start systems. [NATEF VII-F-3]

## Course Standard 10

### TDL-MLR3-10

#### Demonstrate knowledge of air conditioning systems.

- 10.1 Summarize hybrid vehicle air conditioning system electrical circuits and the service/safety precautions. [NATEF VII-B-2]
- 10.2 Perform necessary action required after inspecting the engine cooling and heater systems hoses. [NATEF VII-C-1]
- 10.3 Perform necessary action required after inspecting air conditioning-heater ducts, doors, hoses, cabin filters, and outlets. [NATEF VII-D-1]
- 10.4 Predict sources of air conditioning system odors. [NATEF VII-D-2]

## Course Standard 11

### TDL-MLR3-11

#### Analyze engine performance.

- 11.1 Determine necessary action required after performing engine absolute (vacuum/boost) manifold pressure tests. [NATEF VIII-A-2]
- 11.2 Determine necessary action required after performing a cylinder power balance test. [NATEF VIII-A-3]
- 11.3 Determine necessary action required after performing cylinder cranking and running compression tests. [NATEF VIII-A-4]

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- 11.4 Determine necessary action required after performing a cylinder leakage test. [NATEF VIII-A-5]
- 11.5 Demonstrate the proper procedure to remove and replace spark plugs after inspecting secondary ignition components for wear and damage. [NATEF VIII-A-7]
- 11.6 Analyze the engine performance after retrieving and recording diagnostic trouble codes, On-Board Diagnostics (OBD) monitor status, freeze frame data; and clear codes, when applicable. [NATEF VIII-B-1]
- 11.7 Describe the importance of operating all On-Board Diagnostics (OBDII) monitors for repair verification. [NATEF VIII-B-2]
- 11.8 Perform necessary action required after inspecting, testing the service positive crankcase ventilation (PCV) filter/breather cap, valves, tubes, orifices, and hoses. [NATEF VIII-D-1]

## Course Standard 12

### TDL-MLR3-12

**Examine how SkillsUSA is a co-curricular part of career and technical education through leadership development, school and community service projects, and competitive events.**

- 12.1 Explain the purpose, mission, objectives, motto, colors, official dress and other distinguishing characteristics of SkillsUSA.
- 12.2 Explain how participation in SkillsUSA can promote lifelong responsibility for community service, professional growth and development.
- 12.3 Explore the impact and opportunities that SkillsUSA can develop to bring business and industry together with education in a positive working relationship through innovative leadership and career development programs.
- 12.4 Explore the local, state, and national opportunities available to students through participation in SkillsUSA, including, but not limited to conferences, competitions, community service, philanthropy, and other SkillsUSA activities.