Transportation, Distribution & Logistics Career Cluster
Automobile Service Technology 6
Course Number: 47.43600

Course Description:
Students in this course will learn the basic skills needed to gain employment as a maintenance and light repair technician and will expose students to automotive preventative maintenance, servicing and replacing brakes, and steering and suspension components. The students will also learn how to do general electrical system diagnosis, learn electrical theory, perform basic tests and determine necessary action. In addition, students will learn how to evacuate and recharge air-conditioning systems using the proper refrigerant. The hours completed in this course are aligned with ASE/NATEF standards and are an excellent foundation for an entry-level technician. The pre-requisite for this course is Automobile Service Technology 5.

Course Standard 1

TDL-AST6-1
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

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
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-AST6-2

Identify and utilize safety procedures and proper tools.

The tasks in this standard originate from the NATEF Required Supplemental Tasks.

2.1 Identify general shop safety rules and procedures.
2.2 Utilize 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 Utilize proper ventilation procedures for working within the lab/shop area.
2.6 Identify marked safety areas.
2.7 Identify the location and the types of fire extinguishers and other fire safety equipment; demonstrate knowledge of the procedures for using fire extinguishers and other fires safety equipment.
2.8 Identify the location and use of eye wash stations.
2.9 Identify the location of the posted evacuation routes.
2.10 Comply 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 Secure hair and jewelry for lab/shop activities.
2.13 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 knowledge of material safety data sheets (MSDS).

Course Standard 3

TDL-AST6-3

Identify and utilize proper tools and equipment.

3.1 Identify tools and their usage in automotive applications.
3.2 Identify standard and metric designation.
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-AST6-4

Identify and utilize vehicle service information.

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

Course Standard 5

TDL-AST6-5
Demonstrate General Engine Service Techniques.

Engine Repair

General: Engine Diagnosis; Removal and Reinstallation (R & R)

5.1 Inspect, remove and replace engine mounts (P-2).
5.2 Remove and reinstall engine in an OBDII or newer vehicle; reconnect all attaching components and restore the vehicle to running condition (P-3).

Cylinder Head and Valve Train Diagnosis and Repair

5.3 Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specifications and procedures (P-1).
5.4 Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition (P-1).
5.5 Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine necessary action (P-2).
5.6 Inspect and replace camshaft and drive belt/chain; includes checking drive gear wear and backlash, end play, sprocket and chain wear, overhead cam drive sprocket(s), drive belt(s), belt tension, tensioners, camshaft reluctor ring/tone-wheel, and valve timing components; verify correct camshaft timing (P-1).
5.7 Establish camshaft position sensor indexing (P-1).

Course Standard 6

TDL-AST6-6
Prepare vehicle for general suspension and steering systems service.

Suspension and Steering Systems

Steering Systems Diagnosis and Repair

6.1 Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets (P-2).

Suspension Systems Diagnosis and Repair

6.2 Inspect, remove and install upper and lower control arms, bushings, shafts, and rebound bumpers (P-3).
6.3 Inspect, remove and install upper and/or lower ball joints (with or without wear indicators) (P-3).
6.4 Inspect, remove and install steering knuckle assemblies (P-3).
6.5 Inspect, remove and install short and long arm suspension system coil springs and spring insulators (P-3).
6.6 Inspect, remove and install torsion bars and mounts (P-3).

Wheel alignment diagnosis, adjustment and repair

6.7 Check front and/or rear cradle (subframe) alignment; determine necessary action (P-3).

Course Standard 7

TDL-AST6-7
Perform general electrical systems service.

Electrical/Electronic Systems

Starting system diagnosis and repair

7.1 Differentiate between electrical and engine mechanical problems that cause a slow-crank or a no-crank condition (P-2).

Gauges, warning devices, and driver information systems diagnosis and repair

7.2 Diagnose (troubleshoot) the causes of incorrect operation of warning devices and other driver information systems and determine necessary action (P-2).

Horn and wiper/washer diagnosis and repair

7.3 Diagnose (troubleshoot) causes of incorrect wiper operation, diagnose wiper speed control and park problems, and determine necessary action (P-2).

Accessories diagnosis and repair

7.4 Diagnose (troubleshoot) incorrect electric lock operation (including remote keyless entry) and determine necessary action (P-2).

7.5 Diagnose (troubleshoot) incorrect operation of cruise control systems and determine necessary action (P-3).

7.6 Diagnose (troubleshoot) supplemental restraint systems (SRS) problems and determine necessary action (P-2).

7.7 Check for module communication errors (including CAN/BUS systems) using a scan tool (P-2).

Course Standard 8

TDL-AST6-8

Demonstrate knowledge of air conditioning systems.

General: Air conditioning system diagnosis and repair

8.1 Demonstrate performance testing of the air conditioning system and identify problems (P-1).

8.2 Identify abnormal operating noises in the air conditioning system and determine necessary action (P-2).

8.3 Determine recommended oil and oil capacity for system application (P-1).

8.4 Using a scan tool, observe and record related HVAC data and trouble codes (P-3).

Refrigeration system component diagnosis and repair

8.5 Inspect, test, service or replace air conditioning compressor clutch components and/or assembly; check the compressor clutch air gap and adjust as needed (P-2).

8.6 Remove, inspect, and reinstall air conditioning compressor and mountings and determine recommended oil quantity (P-2).

8.7 Determine the need for an additional air conditioning system filter and perform necessary action (P-3).

8.8 Remove and inspect air conditioning system mufflers, hoses, lines, fittings, O-rings, seals, and service valves and perform necessary action (P-2).

8.9 Remove, inspect, and reinstall receiver/drier or accumulator/drier and determine recommended oil quantity (P-2).

8.10 Remove, inspect, and install expansion valve or orifice (expansion) tube (P-1).

Operating systems and related controls diagnosis and repair

8.11 Diagnose A/C compressor clutch control systems; determine necessary action (P-2).

8.12 Diagnose malfunctions in the vacuum, mechanical, and electrical components and the electrical controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action (P-2).

8.13 Inspect and test A/C-heater control panel assembly; determine necessary action (P-3).

8.14 Inspect and test A/C-heater control cables, motors, and linkages; perform necessary action (P-3).

8.15 Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action (P-2).

Refrigerant recovery, recycling, and handling

8.16 Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards (P-1).

8.17 Recycle, label, and store refrigerant (P-1).

8.18 Evacuate and charge A/C system; add refrigerant oil as required (P-1).

Course Standard 9

TDL-AST6-9
Analyze Engine Performance.

Ignition system diagnosis and repair

9.1 Diagnose (troubleshoot) ignition system related problems such as no-starting, hard starting, engine misfire, poor drivability, spark knock, power loss, poor mileage, and emissions concerns; determine necessary action (P-2).

9.2 Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary (P-3).

Fuel, air induction, and exhaust systems diagnosis and repair

9.3 Inspect and test fuel injectors (P-2).

9.4 Perform exhaust system back-pressure test; determine necessary action (P-2).

Emissions control systems diagnosis and repair

9.5 Diagnose emissions and drivability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action (P-3).

9.6 Inspect, test, service, and replace components of the EGR system including tubing, exhaust passages, vacuum/pressure controls, filters, and hoses; perform necessary action (P-2).

9.7 Inspect and test catalytic converter efficiency (P-2).