# Transportation, Distribution and Logistics Career Cluster
# Advanced Automotive Technology Pathway
# Advanced Automotive Technologies 5
## Course Number 47.44500

**Course Description:** This course is designed as the second course for the Advanced Automotive Technology Pathway. Students in this course will learn the basic skills needed to gain employment as an entry level automotive technician. Students will be exposed to courses in automotive preventative maintenance, brakes, steering and suspension, electrical systems, engine repair, engine performance, automatic transmission, manual transmission and differential & automotive HVAC. The hours completed in this course are aligned with ASE standards and are a base for the entry-level technician. The prerequisite for this course is advisor approval and successful completion of Automotive Technology 4.

All the tasks are assigned a priority number: P-1, P-2, or P-3 (refer to ASE Education Foundation task list https://www.aseeducation.org/resources). The standards recognize that program content requirements vary by program type and regional employment needs. Therefore, flexibility has been built into the task list by assigning each task a priority number. The priority number simply indicates the minimum percentage of tasks that a program must include in their curriculum.

- Ninety-five percent (95%) of Priority 1 (P-1) tasks must be taught.
- Eighty percent (80%) of Priority 2 (P-2) tasks must be taught.
- Fifty percent (50%) of the Priority 3 (P-3) tasks must be taught.

*Note: A task is a psychomotor or cognitive entry-level learning activity consisting of one or more measurable steps accomplished through an instructor presentation, demonstration, visualization or a student application.*

Theory instruction and hands-on performance of all the basic tasks will provide initial training for entry-level employment in the automotive service field or prepare the student for further training. Competency in the tasks will indicate to employers that the graduate has the skills needed for entry-level employment in the automotive service field.

1. It is assumed that:
   - at all levels, appropriate theory, safety, and support instruction will be required for performing each task;
   - the instruction has included identification and use of appropriate tools and testing and measurement equipment required to accomplish certain tasks;
   - the student has received the necessary training to locate and use current reference and training materials from accepted industry publications and resources;
   - at all levels, the student has demonstrated the ability to write work orders and warranty reports, to include information regarding problem resolution and the results of the work performed for the customer and manufacturer. The writing process will incorporate the “Three C’s” (concern, cause and correction) as a format to communicate this information.
   - at all levels, students will become familiar with and use service information and reference materials to develop a problem-solving process/procedure
2. It is assumed that:
   - all diagnostic and repair tasks described in this document are to be accomplished in accordance with manufacturer's recommended procedures and safety precautions as published.

3. It is assumed that:
   - Individual courses of study will differ across automobile training programs and any redundancies in the technical standards are built in to ensure that appropriate review and individual task mastery can be achieved at different levels of the program. They are also built in to allow instruction at different levels of understanding as regional and local industry needs may dictate. Additionally, these standards are a framework from which curriculum, lessons, and units of instruction are built from.
   - development of appropriate learning delivery systems and tests which monitor student progress will be the responsibility of the individual training program.
   - the learning progress of students will be monitored and evaluated against these performance standards;
   - a system is in place that informs all students of their individual progress through all phases of the training program.
4. It is assumed that:
   - all students will receive instruction in the storage, handling, and use of Hazardous Materials as required in Hazard Communication Title 29, Code of Federal Regulation Part 1910.1200, “Right to Know Law”, and state and local requirements.
   - hazardous and toxic materials will be handled, removed and recycled or disposed of according to federal, state, and local regulations.
5. It is assumed that:
   - All required supplemental tasks are being taught and reinforced continually throughout the pathway, they are not intended to be taught as stand-alone concepts or units.

## REQUIRED SUPPLEMENTAL TASKS

**Shop and Personal Safety**

1. Identify general shop safety rules and procedures.
2. Utilize safe procedures for handling of tools and equipment.
3. Identify and use proper placement of floor jacks and jack stands.
4. Identify and use proper procedures for safe lift operation.
5. Utilize proper ventilation procedures for working within the lab/shop area.
6. Identify marked safety areas.
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 fire safety equipment.
8. Identify the location and use of eye wash stations.
9. Identify the location of the posted evacuation routes.
10. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
11. Identify and wear appropriate clothing for lab/shop activities.
12. Secure hair and jewelry for lab/shop activities.
13. Demonstrate awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
14. Demonstrate awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
15. Locate and demonstrate knowledge of material safety data sheets (MSDS).
16. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

**Tools and Equipment**

1. Identify tools and their usage in automotive applications.
2. Identify standard and metric designation.
3. Demonstrate safe handling and use of appropriate tools.
4. Demonstrate proper cleaning, storage, and maintenance of tools and equipment.
5. Demonstrate proper use of precision measuring tools (i.e. micrometer, dial-indicator, dial-caliper).

**Preparing Vehicle for Service**

1. Identify information needed and the service requested on a repair order.
2. Identify purpose and demonstrate proper use of fender covers, mats.
3. Demonstrate use of the three C's (concern, cause, and correction).
4. Review vehicle service history.

**Preparing Vehicle for Customer**

1. Ensure vehicle is prepared to return to customer per school/company policy (floor mats, steering wheel cover, vehicle cleanliness, radio presets, etc.).

## GENERAL COURSE STANDARDS

The following are the General Course Standards, to be integrated throughout the three pathway courses, they are not intended to be taught as stand-alone concepts or units.

### Course Standard 1

**TDL-AT5-GS1**

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. Additional Georgia Standards of Excellence ELA/Literacy standards for Speaking and Listening are listed in the foundational course standards below.

## Course Standard 2

**TDL-AT5-GS2**

**Identify and utilize safety procedures and proper tools.**

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 fire 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).

**Support of CTAE Foundation Course Standards and Georgia Standards of Excellence**

**ELACC9-10SL1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

## Course Standard 3

**TDL-AT5-GS3**

**Research and utilize proper tools and equipment.**

3.1 Identify tools and their usage in automotive applications.
3.2 Identify 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 (e.g. micrometer, dial-indicator, and dial-caliper).

**Support of CTAE Foundation Course Standards and Georgia Standards of Excellence**

**ELACC9-10SL1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

**ELACC9-10SL4:** Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

## Course Standard 4

**TDL-AT5-GS4**

**Research 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 and 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.).
4.7 Identify and use applicable service information materials to include service manuals, manufacturer service information, and bulletins to develop a process/procedure for diagnostics.

**Support of CTAE Foundation Course Standards and Georgia Standards of Excellence**

**ELACC9-10SL1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

## Course Standard 5

**TDL-AT5-GS5**

**Develop an understanding of automotive careers, describing the principal fields of specializations and identifying associated career opportunities.**

5.1 Identify education requirements for automotive occupations and locations where programs of study are available.
5.2 Match automotive job titles with qualifications and responsibilities.
5.3 Participate in activities related to career interests.

**Support of CTAE Foundation Course Standards and Georgia Standards of Excellence**

**ELACC9-10SL1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

**ELACC9-10SL4:** Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

## Course Standard 6

**TDL-AT5-GS6**

**Examine how related student organizations are integral parts of career and technology education courses through leadership development, school and community service projects, and competitive events.**

6.1 Explain the purpose, mission, objectives, motto, colors, official dress and other distinguishing characteristics of SkillsUSA.
6.2 Explain how participation in SkillsUSA can promote lifelong responsibility for community service, professional growth and development.
6.3 Explore the impact and opportunities SkillsUSA can develop to bring business and industry together with education in a positive working relationship through innovative leadership and career development programs.
6.4 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.

**Support of CTAE Foundation Course Standards and Georgia Standards of Excellence**

**ELACC9-10SL1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

**ELACC9-10SL4:** Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

# TECHNICAL STANDARDS

**TDL-AT5-TS1**

## Technical Standard 1

**Perform general engine service.**

**(ASE: A1 Engine Repair)**

**For every task in Engine Repair, the following safety requirement must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

### I. ENGINE REPAIR

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

1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. P-1

2. Research vehicle service information including fluid type, internal engine operation, vehicle service history, service precautions, and technical service bulletins. P-1

### I. ENGINE REPAIR

### B. Cylinder Head and Valve Train Diagnosis and Repair

1. Remove cylinder head; inspect gasket condition; install cylinder head and gasket; tighten according to manufacturer's specification and procedure. P-1

2. Clean and visually inspect a cylinder head for cracks; check gasket surface areas for warpage and surface finish; check passage condition. P-1

3. Inspect pushrods, rocker arms, rocker arm pivots and shafts for wear, bending, cracks, looseness, and blocked oil passages (orifices); determine needed action. P-2

4. Adjust valves (mechanical or hydraulic lifters). P-1

5. 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

6. Establish camshaft position sensor indexing. P-1

7. Inspect valve springs for squareness and free height comparison; determine needed action. P-3

8. Replace valve stem seals on an assembled engine; inspect valve spring retainers, locks/keepers, and valve lock/keeper grooves; determine needed action. P-3

9. Inspect valve guides for wear; check valve stem-to-guide clearance; determine needed action. P-3

10. Inspect valves and valve seats; determine needed action. P-3

11. Check valve spring assembled height and valve stem height; determine needed action. P-3

12. Inspect valve lifters; determine needed action. P-2

13. Inspect and/or measure camshaft for runout, journal wear and lobe wear. P-3

14. Inspect camshaft bearing surface for wear, damage, out-of-round, and alignment; determine needed action. P-3

### I. ENGINE REPAIR

### C. Engine Block Assembly Diagnosis and Repair

1. Remove, inspect, and/or replace crankshaft vibration damper (harmonic balancer). P-1

2. Disassemble engine block; clean and prepare components for inspection and reassembly. P-1

| | |
|---|---|
| 3. Inspect engine block for visible cracks, passage condition, core and gallery plug condition, and surface warpage; determine needed action. | P-2 |
| 4. Inspect and measure cylinder walls/sleeves for damage, wear, and ridges; determine needed action. | P-2 |
| 5. Deglaze and clean cylinder walls. | P-2 |
| 6. Inspect and measure camshaft bearings for wear, damage, out-of-round, and alignment; determine needed action. | P-3 |
| 7. Inspect crankshaft for straightness, journal damage, keyway damage, thrust flange and sealing surface condition, and visual surface cracks; check oil passage condition; measure end play and journal wear; check crankshaft position sensor reluctor ring (where applicable); determine needed action. | P-1 |
| 8. Inspect main and connecting rod bearings for damage and wear; determine needed action. | P-2 |
| 9. Identify piston and bearing wear patterns that indicate connecting rod alignment and main bearing bore problems; determine needed action. | P-3 |
| 10. Inspect and measure piston skirts and ring lands; determine needed action. | P-2 |
| 11. Determine piston-to-bore clearance. | P-2 |
| 12. Inspect, measure, and install piston rings. | P-2 |
| 13. Inspect auxiliary shaft(s) (balance, intermediate, idler, counterbalance and/or silencer); inspect shaft(s) and support bearings for damage and wear; determine needed action; reinstall and time. | P-2 |
| 14. Assemble engine block. | P-1 |

**Support of CTAE Foundation Course Standards and Georgia Standards of Excellence**

**ELACC9-10SL4:** Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

**TDL-AT5-TS5**

# Technical Standard 5

**Brake System Service**

**(ASE: A5 Brakes System Service and Repair)**

**For every task in Brakes, the following safety requirement must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

**V. BRAKES**

**G. Electronic Brake Control Systems: Antilock Brake (ABS), Traction Control (TCS), and Electronic Stability Control (ESC) Systems Diagnosis and Repair**

| | |
|---|---|
| 1. Identify and inspect electronic brake control system components (ABS, TCS, ESC); determine needed action. | P-1 |
| 2. Describe the operation of a regenerative braking system. | P-3 |

| | |
|---|---|
| 3. Diagnose poor stopping, wheel lock-up, abnormal pedal feel, unwanted application, and noise concerns associated with the electronic brake control system; determine needed action. | P-2 |
| 4. Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine needed action. | P-2 |
| 5. Depressurize high-pressure components of an electronic brake control system. | P-2 |
| 6. Bleed the electronic brake control system hydraulic circuits. | P-1 |
| 7. Test, diagnose, and service electronic brake control system speed sensors (digital and analog), toothed ring (tone wheel), and circuits using a graphing multimeter (GMM)/digital storage oscilloscope (DSO) (includes output signal, resistance, shorts to voltage/ground, and frequency data). | P-2 |
| 8. Diagnose electronic brake control system braking concerns caused by vehicle modifications (tire size, curb height, final drive ratio, etc.). | P-1 |

**Support of CTAE Foundation Course Standards and Georgia Standards of Excellence**

**ELACC9-10SL1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.

**TDL-AT5-TS6**

# Technical Standard 6

**Electrical System Service**

**(ASE: A6 Electrical/Electronic Systems Service and Repair)**

**For every task in Electrical/Electronic Systems, the following safety requirement must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

## VI. ELECTRICAL/ELECTRONIC SYSTEMS

### G. Body Electrical Systems Diagnosis and Repair

| | |
|---|---|
| 1. Diagnose operation of comfort and convenience accessories and related circuits (such as: power window, power seats, pedal height, power locks, truck locks, remote start, moon roof, sun roof, sun shade, remote keyless entry, voice activation, steering wheel controls, back-up camera, parking assist, cruise control, and auto dimming headlamps); determine needed repairs. | P-2 |
| 2. Diagnose operation of security/anti-theft systems and related circuits (such as: theft deterrent, door locks, remote keyless entry, remote start, and starter/fuel disable); determine needed repairs. | P-2 |
| 3. Diagnose operation of entertainment and related circuits (such as: radio, DVD, remote CD changer, navigation, amplifiers, speakers, antennas, and voice-activated accessories); determine needed repairs. | P-3 |
| 4. Diagnose operation of safety systems and related circuits (such as: horn, airbags, seat belt pretensioners, occupancy classification, wipers, washers, speed control/collision avoidance, heads-up display, parking assist, and back-up camera); determine needed repairs. | P-1 |
| 5. Diagnose body electronic systems circuits using a scan tool; check for module communication errors (data communication bus systems); determine needed action. | P-2 |
| 6. Describe the process for software transfer, software updates, or reprogramming of electronic modules. | P-2 |

**Support of CTAE Foundation Course Standards and Georgia Standards of Excellence**

**ELACC9-10SL4:** Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.

**TDL-AT5-TS8**

# Technical Standard 8

## Engine Performance Service

## (ASE: A8 Engine Performance Service and Repair)

**For every task in Engine Performance the following safety requirement must be strictly enforced: Comply with personal and environmental safety practices associated with clothing; eye protection; hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations.**

### VIII. ENGINE PERFORMANCE

### D. Fuel, Air Induction, and Exhaust Systems Diagnosis and Repair

| | |
|---|---|
| 1. Diagnose (troubleshoot) hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine needed action. | P-2 |
| 2. Check fuel for contaminants; determine needed action. | P-2 |
| 3. Inspect and test fuel pump(s) and pump control system for pressure, regulation, and volume; perform needed action. | P-1 |
| 4. Replace fuel filter(s) where applicable. | P-2 |
| 5. Inspect, service, or replace air filters, filter housings, and intake duct work. | P-1 |
| 6. Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air. | P-2 |
| 7. Inspect, test, and/or replace fuel injectors. | P-2 |
| 8. Verify idle control operation. | P-1 |
| 9. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform needed action. | P-1 |
| 10. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine needed action. | P-1 |
| 11. Perform exhaust system back-pressure test; determine needed action. | P-2 |
| 12. Check and refill diesel exhaust fluid (DEF). | P-2 |
| 13. Test the operation of turbocharger/supercharger systems; determine needed action. | P-2 |

**Support of CTAE Foundation Course Standards and Georgia Standards of Excellence**

**ELACC9-10SL1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.