Escondido Union High School District

Auto Technology 2

EUHSD Board Approval Date: 12/12/17
The EUHSD Auto Technology 2 curriculum document identifies what students should be able to know by grade level in a comprehensive standards-based course of study. The curriculum is aligned to the California Career Technical Education Model Curriculum Standards in the Transportation Industry Sector and the Systems Diagnostics, Service, and Repair Pathway. The Auto Technology 2 course is the final course in a four-year sequence of courses. The curriculum document is updated annually based on student academic achievement data, research and best practices, and input from stakeholders. The EUHSD curriculum document contains the following documents and/or information:

A. Course Description
B. Course Guidelines/Requirements – graduation credit information, transcript information, adopted materials, adopted technology, assessment outline
C. Instructional Materials References
D. Scope and Sequence Map with Essential Standards outlined by Unit
E. References to key essential design and implementation documents

A comprehensive course of study and/or program is designed so that all students have access to the rigorous curriculum necessary to graduate high school college and career ready. Student-Centered learning provides opportunity for collaboration, communication, and a robust learning environment and provides opportunities for all students to meet the goals of the district’s Instructional Focus at the time of this writing: “All students communicate their thinking, ideas and understanding by effectively using oral, written and/or non-verbal expression.”

A key design consideration in the transition to the new California State Standards is a focus on changes to pedagogy. The English Language Arts instructional shifts guide classroom teaching and learning and the foundation of curriculum and instructional design. Key considerations of the ELA Instructional shifts can be found by visiting the following URL: http://www.corestandards.org/other-resources/key-shifts-in-english-language-arts/.

The curriculum document is aligned to the California Model Career Technical Education Standards and reflects learning outcomes from both the anchor and pathway standards.
Auto Technology 2 Course Description

Auto Technology 2 is the second course in a sequence of courses within the Transportation Industry Sector and the Systems, Diagnostics, Service, and Repair Career Pathway. The course was written to align to the skills and competencies outlined within the California Model Career Technical Education Standards. As a second-year course, students will work both independently and in small and large group settings where they will participate in a variety of performance based tasks that build upon the skills and competencies in year 1. Both classroom and hands-on lab experiences are designed to cover maintenance, electrical systems, lubrication expectations, and cooling and fuel systems. Students will continue to explore a variety of automotive systems; including brakes, steering and suspension, front-end alignment, power train and air conditioning, etc. This course is designed as part of an automotive technology pathway designed to assist students in meeting college and career readiness skills in the transportation industry sector. Students will also continue to enhance their career portfolio, which will include ongoing development of a professional resume.

<table>
<thead>
<tr>
<th>Course Requirements</th>
<th>Grade Level: 9-12</th>
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<tbody>
<tr>
<td>Course Length: Year Long</td>
<td>UC/CSU Requirement: Meets UC/CSU “g” Elective Requirement</td>
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<td>UC/CSU Requirement: Meets UC/CSU “g” Elective Requirement</td>
<td>Graduation Requirement: Elective or CTE Requirement</td>
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<tr>
<td>Course Number (Semester A): 6344</td>
<td>Transcript Abbreviation (Semester A): AUTO TECH 2 A (P)</td>
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<tr>
<td>Course Number (Semester B): 6345</td>
<td>Transcript Abbreviation (Semester B): AUTO TECH 2 B (P)</td>
</tr>
<tr>
<td>Credits (Semester A): 5 CTE or Elective</td>
<td>Credit (Semester B): 5 Elective or CTE</td>
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<tr>
<td>Required Prerequisite/s:</td>
<td>Recommended Prerequisite/s:</td>
</tr>
<tr>
<td>• Concurrent Enrollment or Completion of Math 1 or Algebra 1</td>
<td>• Auto Technology 1 or Teacher Recommendation</td>
</tr>
<tr>
<td>Industry Sector: Transportation</td>
<td>Career Pathway: Systems, Diagnostics, Service and Repair</td>
</tr>
<tr>
<td>Board Approval Date (Curriculum): 12/12/17</td>
<td>Board Approval Date (Materials): N/A</td>
</tr>
<tr>
<td>Core Instructional Material/s:</td>
<td>Supplemental Instructional Material/s:</td>
</tr>
<tr>
<td>• Modern Automotive Technology; 7th edition by James E. Duffy. ©2009</td>
<td>• Modern Automotive Technology Workbook</td>
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<td>• Auto Engine Performance and Drivability</td>
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<td>• Auto Engine Performance and Drivability workbook</td>
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<td>• <a href="https://www.ase.com/Home.aspx">https://www.ase.com/Home.aspx</a></td>
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<td>• <a href="https://www.caljobs.ca.gov/vosnet/Default.aspx">https://www.caljobs.ca.gov/vosnet/Default.aspx</a></td>
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<td></td>
<td>• Teacher demonstration, video, power point and handouts</td>
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<td></td>
<td>• Cars.com</td>
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<td>• Tech News Today</td>
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<td>• Popular Mechanics</td>
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<td>• Carcarenewsservice.org</td>
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<td>• Scotty kilmer.com</td>
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<td>• Eric the car guy.com</td>
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<td>• Coolant experts.com</td>
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<td>• Cumminsfiltration.com</td>
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<td></td>
<td>• <a href="http://www.tundrasolutions.com">www.tundrasolutions.com</a></td>
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</tbody>
</table>
### Technology Resource/s:
- Various automotive technology resources as outlined in the scope and sequence document
- All Data (software)
- Mitchell On Demand (software)
- ASE (software)
- SP2 (software)
- WorkSafe (software)

### Assessment/s: The course is designed as a project-based curriculum. Each unit outlines specific skills and/or long-term projects, which serve as unit and course assessments.

### Meeting the Needs of ELs:
- Utilize the student information system to acquire the language levels of EUHSD English Learners.
- In 2012, the CA Department of Education adopted new language level proficiency descriptors and new EL state standards. Visit the following website to learn more about those new descriptors and corresponding standards: [http://www.cde.ca.gov/sp/el/er/documents/eldstndspub.pdf](http://www.cde.ca.gov/sp/el/er/documents/eldstndspub.pdf)
- In 2014, the CA Department of Education adopted new ELA-ELD Framework, with specific strategies designed to meet the needs of EL students. Visit the following URL to learn more about the new frameworks: [http://www.cde.ca.gov/ci/rl/cf/documents/elaeldfwchapter11.pdf](http://www.cde.ca.gov/ci/rl/cf/documents/elaeldfwchapter11.pdf)
The Scope and Sequence Guide is a California standards based and Career Technical Education standards based document that delineates the skills students are expected to know and do in order to meet College and Career Readiness expectations. Each unit of study in the Scope and Sequence document is designed to build upon the previous unit and/or prerequisite coursework in support of student mastery of specific standards based skills. The Scope and Sequence document provides the framework of understanding for key assignments, key assessments, and instructional resources and strategies that serve to assist students in meeting unit-learning objectives. The document will be updated annually with input from all stakeholders.

In coursework requiring reading and writing, the following standards are not specifically stated in any one unit of study, but are the result of implementation throughout the curriculum as students participate in reading, writing, and speaking/listening standards based activities.

- By the end of grade 11, students will read and comprehend literary nonfiction in the grades 11-CCR text completely and proficiently, with scaffolding as needed at the high range. (Reading Informational Text Standard 10)
- Students will write routinely over extending time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks and purposes. (Writing Standard 10)
- “To be college and career ready, students must have ample opportunities to take part in a variety of rich and structured conversations – as part of a whole class, in small groups, and with a partner – build around important content in various domains. They must be able to contribute appropriately to conversations, make comparisons and contrasts, and analyze and synthesize a multitude of ideas according to the standards of evidence appropriate to a particular discipline.” (Standards for ELA Anchor Standards for Speaking/Listening)
Auto Technology 2 Scope and Sequence

Unit 1 – Careers, Certifications and Overview of Automotive Technology, Processes, Tools, Mechanics and Safe Work Practices

Length: 3 Weeks

**Unit Description:** Unit 1 in Auto 2 is designed to build upon the skills and competencies acquired in Automotive 1. In order to participate in the shop setting, students will conduct a thorough review of all auto shop and classroom safety procedures. This includes a comprehensive hands-on demonstration of safety procedures associated with the use of automotive tools and mechanics, maintenance of the shop, general procedures and safety practices for lifting, working independently and collaboratively. Students will also review proper protocols for addressing incidents and accidents occurring in the classroom and shop setting. Students will be able to recognize, identify, and list the potential hazards of working in an auto shop environment. Students will also begin to build a portfolio of learning designed to assist them in identifying entry-level employment opportunities as a result of changes to the automotive industry.

**Unit Standards:**

**Transportation Knowledge and Performance Anchor Standards:** (The Anchor Standards are repeated throughout each unit/course of study)

**Communications:**
- 2.3 Interpret verbal and nonverbal communication and respond appropriately.
- 2.4 Demonstrate elements of written and electronic communication, such as accurate spelling, grammar, and formatting.
- 2.5 Communicate information and ideas effectively to multiple audiences using a variety of media and formats.

**Health and Safety:**
- 6.1 Locate and adhere to Material Safety Data Sheet (MSDS) instructions.
- 6.2 Interpret policies, procedures, and regulations for the workplace environment, including employer and employee responsibilities. (This standard fits into the classroom/workspace environment too.)
- 6.3 Use health and safety practices for storing, cleaning, and maintaining tools, equipment, and supplies.
- 6.4 Practice personal safety when lifting, bending, or moving equipment and supplies.
- 6.5 Demonstrate how to prevent and respond to work-related accidents or injury this includes demonstrating an understanding of ergonomics.

**Leadership and Teamwork:**
- 9.3 Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace setting.

**Technical Knowledge and Skills:**
- 10.1 Interpret and explain terminology and practices specific to the Transportation sector.

**Learning Objectives:**

**Students will be able to...**
- Identify and locate parts of a vehicle.
- Evaluate automotive careers.
- Describe the type of skills needed to be an Auto Technician.
- Identify automotive hand tools.
- List safety rules for hand tools.
- Identify fire exits, wash stations, drainage locations, water shut off valves, non-skid floor mats, and other essential safety equipment.
- Perform and/or identify key personnel to perform basic first aid in the event of an accident or emergency.
- Identify locations for storage of essential equipment, including containers, tools, and mechanical equipment.
- Select the right tool for a given job.
- Maintain and store tools properly.
- Use tools safely.
- Describe safety precautions to be taken in an automotive shop.
- Explain the advantages of one tool type over another.
- Explain safety rules that pertain to power tools and equipment.
- Explain the types of accidents that can occur in an auto shop.
- Explain how to prevent auto shop accidents.

**Unit Assignments:**

- All students will be expected to keep a digital or print notebook that serves to contain key vocabulary and terminology associated with their industry sector. The notebook will also include key diagrams, key safety notes, and reflection summaries on key performance tasks and assignments completed throughout the course.
- All students will participate in a hands-on safety test demonstrating understanding of key safety procedures for addressing incidents and accidents occurring within the shop and through use of equipment and tools. Students will identify fire exits, wash stations, drainage valves, nonskid floor mats, handling of essential safety equipment, etc. Students will be expected to identify these elements within the classroom and participate in a safety test where they must demonstrate safety procedures with 100% accuracy.
- Students will complete a comprehensive review of the tools and machines available within the automotive lab setting. They will review the routine maintenance of each tool, proper storage techniques, proper handling techniques, safety equipment requirements as a result of use, and will perform hands-on demonstrations with 100% accuracy prior to using any tool and/or piece of equipment.
- Tool Skills Test - Students will be given a sample project and will be required to select the appropriate...
### Demonstration and Application:
11.5 Create a portfolio or similar collection of work that offers evidence through assessment and evaluation of skills and knowledge competency in the anchor standards, pathway standards, and performance indicators. (Students will create the portfolio beginning in Unit 1 and showcase work throughout the course of study.)

### Transportation Pathway Standards:

#### Systems Diagnostics, Service, and Repair Pathway:

**C1.0 Demonstrate the practice of personal and occupational safety and protecting the environment by using materials and processes in accordance with manufacturer and industry standards.**

**C1.1 Know and understand common environmental conservation practices and their applications.**

**C1.2 Practice the safe handling and storage of chemicals and hazardous wastes in accordance with material safety data sheets and the requirements of local, state, and federal regulatory agencies.**

**C1.3 Understand the way in which waste gases, emissions, and other environmentally destructive substances are generated and the effects of these substances on the environment.**

**C1.4 Use appropriate personal protective equipment and safety practices.**

**C2.0 Practice the safe and appropriate use of tools, equipment, and work processes.**

**C2.2 Demonstrate and use appropriate tools and equipment—such as wrenches, sockets, and pliers—to diagnose, service, repair, and maintain systems and components.**

**C2.3 Use tools, equipment, and machines to safely measure, test, diagnose, and analyze components and systems (e.g., electrical and electronic circuits, alternating- and direct-current applications, fluid/hydraulic and air/pneumatic systems).**

**C2.4 Select and use the appropriate measurement device(s) and use mathematical functions necessary to perform required fabrication, maintenance, and operation procedures.**

**C2.5: Use measurement scales, devices, and systems, such as dial indicators and micrometers, to design, fabricate, diagnose, maintain, and repair vehicles and components following recommended industry standards.**

**C2.7 Test and analyze the elements of precision measuring using standard and metric systems.**

- • Work well independently and with teams.
- • Write routinely over time— including summarizing key information from informational text.
- • Demonstrate speaking and listening skills.
- • Gather evidence from text; including reading graphs and charts and restating information.

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- • Tools and justify their selections. Select and justify the appropriate tools for a given project.
- • Students will attend a job shadow presentation set up by their instructor. The purpose of the job shadow presentation is to showcase.
- • All of the students in the year 2 course are expected to complete a job shadow experience. In order to introduce the concept of a “job shadow”, the students will hear from an industry expert in the transportation industry. Students will learn about the various duties and experiences of a worker through a “shadow” experience. The experience will allow the student to learn first-hand the types of career skills and dispositions needed in specific fields. Students will write a 1-page reflection of the industry experts presentation and will identify an area of interest for their own job shadow experience. Students will also begin conducting research on the types of careers available in an ever changing industry. They will write a 1-page paper on a specific career, which will include the educational requirements and job outlook as part of their ongoing research in career exploration within the industry. Students will also be introduced to the ASE (Automotive Service Excellence) certification process and will begin to examine the skills and dispositions required in order to receive certification.
Reading Standards for Literacy CTE Grade 9/10:

Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

Writing Standards for Literacy CTE Grade 9/10:

Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
<table>
<thead>
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<th>Unit Assessments:</th>
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<tbody>
<tr>
<td>Core Text:</td>
<td></td>
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<tr>
<td>• <em>Modern Automotive Technology</em> 7th ed. (chapters 1-5 and 80)</td>
<td>• Student Notes</td>
</tr>
<tr>
<td>• <em>Auto Engine Performance and Drivability</em> (chapter 22)</td>
<td>• Teachers create day-to-day formative assessments that guide instructional decision-making.</td>
</tr>
<tr>
<td>Supporting Text:</td>
<td>• A safety procedures test - with 100% accuracy.</td>
</tr>
<tr>
<td>• <em>Modern Automotive Technology</em> Workbook</td>
<td>• Shop procedures</td>
</tr>
<tr>
<td>• <em>Auto Engine Performance and Drivability</em> (chapter 2 and 22)</td>
<td>• Automotive Careers Paper</td>
</tr>
<tr>
<td>• <em>Auto engine Performance and Drivability</em> workbook</td>
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<tr>
<td>• Online Text(s)</td>
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<tr>
<td>Supplemental Resources:</td>
<td></td>
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<tr>
<td>• Automotive Service Excellence (ASE)</td>
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<td>• CALJOBS</td>
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<td>• All Data</td>
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<td>• Mitchell On Demand</td>
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</table>
Auto Technology 2 Scope and Sequence
Unit 2 – Electrical Systems
Length: 4 Weeks

Unit Description: In Unit 2, students build upon the foundational learning from Unit 8 (Auto 1) and continue to explore the primary functions and operations of transportation electrical systems. They are expected diagnosis and repair the major electrical systems components and explain the operational function. This includes: battery, starting, charging, ignition, and other electrical systems.

Unit Standards:

C1.0 Demonstrate the practice of personal and occupational safety and protecting the environment by using materials and processes in accordance with manufacturer and industry standards.
C1.1 Know and understand common environmental conservation practices and their applications.
C1.2 Practice the safe handling and storage of chemicals and hazardous wastes in accordance with material safety data sheets and the requirements of local, state, and federal regulatory agencies.
C1.3 Understand the way in which waste gasses, emissions, and other environmentally destructive substances are generated and the effects of these substances on the environment.
C1.4 Use appropriate personal protective equipment and safety practices.
C1.5 Practice the safe and appropriate use of tools, equipment, and work processes.
C1.6 Demonstrate and use appropriate tools and equipment—such as wrenches, sockets, and pliers—to diagnose, service, repair, and maintain systems and components.
C1.7 Use tools, equipment, and machines to safely measure, test, diagnose, and analyze components and systems (e.g., electrical and electronic circuits, alternating- and direct-current applications, fluid/hydraulic and air/pneumatic systems).
C1.8 Select and use the appropriate measurement device(s) and use mathematical functions necessary to perform required fabrication, maintenance, and operation procedures.
C1.9 Use measurement scales, devices, and systems, such as dial indicators and micrometers, to design, fabricate, diagnose, maintain, and repair vehicles and components following recommended industry standards.
C1.10 Test and analyze the elements of precision measuring using standard and metric systems.
C1.11 Demonstrate the function, principles, and operation of electrical and electronic systems using manufacturer and industry standards.
C1.12 Practice maintenance, diagnosis, and repair of electrical systems.

Learning Objectives:

Students will be able to…
- Maintain and store tools properly.
- Use tools safely.
- Describe safety precautions to be taken in an automotive shop.
- Explain the advantages of one tool type over another.
- Explain safety rules that pertain to power tools and equipment.
- Explain the types of accidents that can occur in an auto shop.
- Explain how to prevent auto shop accidents.
- Work well independently and with teams.
- Write routinely over time – including summarizing key information from informational text.
- Demonstrate speaking and listening skills.
- Gather evidence from text; including reading graphs and charts and restating information.
- Perform routine diagnose and maintenance of electrical systems.
- Practice skills with accuracy.
- Service and repair a variety of electronic systems using industry standards.
- Assess their own learning based upon industry standards.

Unit Assignments:

- In order to understand and determine potential problems that are caused by electrical faults, students will perform a visual inspection of the electrical system, use test lights and digital multi meters to check electrical system components. Students will then perform basic electrical tests and will diagnose and make repairs to electrical systems and/or components. The teacher will provide a series of performance based tasks and students will perform the tasks by demonstrating the function, principles, and operation of the electrical and electronic systems according to industry standards. Students will complete their skills tests with 100% accuracy. Students may be placed into groups and they will assess their own competency and that of their peers using industry standard specifications. Students will both individually and collaboratively correctly explain how temperature and other factors effect electrical systems. They will be expected to diagnose ignition system related problems such as no starting, hard starting, engine misfire, poor drive availability, spark knock, power loss, poor mileage, and emission concerns; determine necessary action. They are expected to explain the purpose and operation of on board diagnostic systems and demonstrate understanding of electrical diagnostic methods. Students will then write a summary reflection of their performance task and submit it to their teacher as part of their metacognitive review.
- Students will conduct research and will read a variety of informational articles on electrical systems used in today’s transportation industry. They will research the systems and specific careers associated with a
| C7.2 | Maintain, diagnose, repair, and service batteries. |
| C7.3 | Demonstrate maintenance, diagnosis, service, and repair of starting and charging systems. |
| C7.4 | Diagnose, service, and repair lighting systems. |
| C7.7 | Perform necessary procedures to maintain, diagnose, service, and repair vehicle electrical and electronic systems and malfunctions. |

**Reading Standards for Literacy CTE Grade 9/10:**

Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

**Writing Standards for Literacy CTE Grade 9/10:**

Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and

specialized career in electrical systems – including educational requirements for certification. They will add this information to their portfolio.
limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

### Instructional Resources:

**Core Text:**
- *Modern Automotive Technology* 7th ed. (chapters 8, 28-37)
- *Auto Engine Performance and Drivability* (chapters 6-8, 14-16)

**Supporting Text:**
- *Modern Automotive Technology* Workbook
- *Auto Engine Performance and Drivability*
- *Auto engine Performance and Drivability* workbook
- Online Text(s)

**Supplemental Resources:**
- Automotive Service Excellence (ASE)
- SP2
- WorkSafe

### Unit Assessments:

- Teachers create day-to-day formative assessments that guide instructional decision-making
- A safety procedures test - with 100% accuracy for tools that are new to each unit of study.
- Electrical Systems Skills tests (identification and maintenance)
- Notebook Written Reflections
Auto Technology 2 Scope and Sequence
Unit 3 – Fuel Systems
Length: 6 Weeks

Unit Description: In Unit 3, students will conduct research on the types of fuels utilized within the transportation industry. They are expected to describe the properties of current automotive fuels, the normal and abnormal combustion processes, analyze and interpret alternative fuel sources and the effects of fuel sources on the environment. They will also explain the rationale for emission control policies.

Unit Standards:

<table>
<thead>
<tr>
<th><em>Unit 3 utilizes industry standards from each of the four pathways within the Industry Sector.</em></th>
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</table>

**Operations Pathway:**
A3.3 Describe hazardous and nonhazardous materials handling.
A3.6 Determine the effects of government regulations on stock handling techniques and warehousing.
A4.5 Identify the legal aspects of sales contracts and warranties.
A5.1 Identify environmental conditions that would impact various aspects of the transportation industry.
A6.3 Conform to federal, state, and local regulations and manufacturer’s specifications when handling, storing, and disposing of chemicals and equipment, including necessary certifications.
A6.4 Adhere to ergonomic and environmental safety regulations in the workplace.
A6.6 Determine the safe and correct application and use for chemicals used in the transportation industry.
A7.3 Define fueling infrastructure needed to move vehicles, equipment, goods, and services from one location to another.
A7.5 Evaluate the need to safely move fluids from one location to another.
C4.0 Perform and document maintenance procedures in accordance with the recommendations of the manufacturer.
C4.1 Communicate the procedures and practices of various manufacturers regarding service, repair, and maintenance schedules. C4.2 Demonstrate how to properly document maintenance and repair procedures in accordance with applicable rules, laws, and regulations (e.g., Bureau of Auto Repair [BAR], Occupational Safety and Health Administration [OSHA], and the California Air Resources Board [ARB]). C4.3 Use reference books, technical service bulletins, and other documents and materials related to the service industry available in print and through electronic retrieval systems to accurately diagnose and repair systems, equipment, and vehicles.

**Learning Objectives:**

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<td>Work well independently and with teams.</td>
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<td>Write routinely over time – including summarizing key information from informational text.</td>
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<td>Demonstrate speaking and listening skills.</td>
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<tr>
<td>Gather evidence from text; including reading graphs and charts and restating information.</td>
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<tr>
<td>Perform routine diagnose and maintenance of fuel systems.</td>
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<td>Inspect and test carburetor circuits.</td>
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<td>Identify tests and services various components of the system.</td>
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<td>Inspect and tests fuel pressure regulation systems and components of injection type fuel systems; adjust or replace as needed.</td>
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<tr>
<td>Identify proper fuel usage: gasoline vs. diesel.</td>
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<tr>
<td>Identify throttle body (TBI) and port fuel injection systems.</td>
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<td>Understand induction and exhaust systems including turbochargers and superchargers.</td>
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</table>

**Unit Assignments:**

Students will participate in a variety of skills tests that assist them in identification of key components of a fuel system and routine maintenance and diagnosis of fuel system components and functions. Students will complete the following tasks and will use an industry work order when writing up their diagnosis and maintenance treatment plans:

- correctly identify one, two, and four barrel carburetors through both a visual demonstration and hands on practice.
- correctly identify fuel storage tanks. Students will inspect and replace fuel lines as needed and remove and replace system components.
- correctly complete a mile per gallon (MPG) study on multiple vehicles.
- correctly identify under hood fuel injection systems.
- correctly identify induction and exhaust system design differences.
- Students will perform exhaust system repairs and demonstrate an understanding of safety procedures for working on exhaust systems, turbochargers and superchargers. They will be assessed using an industry specific rubric and will continue performing system repairs and demonstrations leading to a final demonstration of learning hands-on assessment.
- Students will be expected to diagnose 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 necessary action. They will write out their course of action according to industry standards and submit the proposal to their instructor.
C4.4 Complete a work order, including customer information, description of repairs, and billing information, in accordance with applicable rules, laws, and regulations.

**Reading Standards for Literacy CTE Grade 9/10:**

Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

**Writing Standards for Literacy CTE Grade 9/10:**

Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience.

- Students will perform a series of routine fuel skills tests that include:
  - Check fuel for contaminants and quality; determine necessary action.
  - Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.
  - Replace fuel filters.
  - Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.
  - Inspect and test fuel injectors.
  - Verify idle control operation.
  - Inspect the integrity of the exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields, perform necessary action.
  - Perform exhaust system backpressure test; determine necessary action.
  - Test the operation of turbocharger/supercharger systems; determine necessary action.
  - Diagnose oil leaks, emissions and drivability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action. Students will write up a rationale for their diagnosis and the necessary course of action and submit to their instructor.

- Students will perform the following routine inspection tests and will perform necessary actions based upon their inspections (utilizing industry standards)
  - Inspect, test, and service positive crankcase ventilation system (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.
  - Inspect, test, service, and replace components of the exhaust gas recirculation (EGR) system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.
  - Inspect and test electrical/electronic sensors, controls, and wiring, of exhaust gas recirculation (EGR) systems; perform necessary action.
integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. Write routinely over extended time frames (including time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.

- Diagnose emissions and drivability concerns caused by the secondary air injection and catalytic converter systems; determine necessary action.
- Inspect and test mechanical components of secondary air injection systems; perform necessary action.
- Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.
- Inspect and test catalytic converter efficiency.
- Diagnose emissions and drivability concerns caused by the evaporative (EVAP) emissions control system; determine necessary action.
- Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.

As a summary of their learning, students will add the protocols for inspection to their notes and will write summary reflections, as assigned by their instructor, as a part of each segment of learning.

- Students will conduct research and will read a variety of informational articles on fuel systems used in today’s transportation industry. They will research the systems and specific careers associated with a specialized career in fuel systems – including educational requirements for certification. They will add this information to their portfolio.
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<td>● <em>Modern Automotive Technology</em>, 7th ed. (chapters 20-27, 43 and 44)</td>
<td>● A safety procedures test - with 100% accuracy for tools that are new to each unit of study.</td>
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<td>● <em>Auto Engine Performance and Drivability</em> (chapter 9, 10, 17-18)</td>
<td>● Fuel Systems Skills tests (identification and maintenance)</td>
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Auto Technology 2 Scope and Sequence
Unit 4 – Suspension, Steering and Brakes
Length: 23 Weeks

Unit Description: Unit 4 is the culminating unit in the course of study for Automotive 2. Students will complete a series of hands-on diagnosis and repair tasks on the suspension and steering and break systems. The skills tests are designed to equip students with the knowledge and hands-on skills that would lead to entry-level positions within the automotive industry. In the shop setting, students will work on donated automobiles that provide for real world hands-on experiences in the demonstration of the function and principles of automotive drivetrain, steering and suspension, brake, and wheel components and systems in accordance with industry standards. As a capstone event in Unit 4, students will summarize their learning by creating a resume and cover letter that they could provide to a potential employer.

Unit Standards:

Anchor Standards:
3.1 Identify personal interests, aptitudes, information, and skills necessary for informed career decision making
3.4 Research the scope of career opportunities available and the requirements for education, training, certification, and licensure.
3.5 Integrate changing employment trends, societal needs, and economic conditions into career planning.
3.6 Recognize the role and function of professional organizations, industry associations, and organized labor in a productive society.
3.9 Develop a career plan that reflects career interests, pathways, and postsecondary options.
11.1 Utilize work-based/workplace learning experiences to demonstrate and expand upon knowledge and skills gained during classroom instruction and laboratory practices specific to the Transportation sector program of study.
5 T | California Career Technical Education Model Curriculum Standards
11.2 Demonstrate proficiency in a career technical pathway that leads to certification, licensure, and/or continued learning at the postsecondary level.
11.3 Demonstrate entrepreneurship skills and knowledge of self-employment options and innovative ventures.
11.4 Employ entrepreneurial practices and behaviors as appropriate to the Transportation sector opportunities.
11.5 Create a portfolio, or similar collection of work, that offers evidence through assessment and evaluation of skills and knowledge competency as contained in the anchor standards, pathway standards, and performance indicators.
C8.0 Demonstrate the function and principles of automotive drivetrain, steering and suspension, brake, and tire and wheel components and systems in accordance with national industry standards.

Learning Objectives:

Students will be able to:
- Compare and contrast, drum brakes and disc brakes.
- Describe the operation of parking brakes.
- Explain the operation of power brakes.
- Describe basic procedures for servicing a master cylinder and brake booster.
- Explain how to service a drum brake assembly and a disc brake assembly.
- Cite the safety rules to be followed in servicing brake systems.
- Describe the purpose and operation of traction control and stability control systems.
- Compare anti-lock brake design variations.
- Describe methods of tire construction.
- Explain tire and wheel sizes.
- Describe tire ratings.
- Identify friction and non-friction bearing.
- Explain and perform static and dynamic wheel balance.
- Identify major components of suspension systems.
- Explain automatic suspension leveling systems.
- Describe the removal and replacement of springs.

Skills Tests include:
- Identify and record the sidewall data on a tire.
- List eight functions of a suspension system.
- Diagnose a suspension problem.
- Diagnose a steering problem.
- Diagnose a brake problem.
- Diagnose shock absorber anomaly.
- Wheel bearing service.
- Demonstrate lug nut/bolt torque values.
- Diagnose common brake system problems.
- Perform proper procedures for both manual and pressure bleeding of a brake system.

Unit Assignments:

- Suspension, Steering, Brake, and Tire Performance Tasks: Throughout unit, students will be broken up into teams and will perform a variety of performance based tasks according to industry standards (as outlined below) in order to demonstrate their learning of the function and principles of the automotive drivetrain, steering and suspension, brake, and tire components and systems. Students will be assessed on their performance using industry standard rubrics. Students will be expected to perform a variety of oral competencies illustrating how to maintain, diagnose, service, and repair systems. They will be expected to describe the functions of the system both orally and in writing. Students will use industry standards to write up treatment plans for routine maintenance and more extensive repairs, which will include cost of repair according to industry standards. They will also add information to their notes, which will serve as a foundation for their completion of the ASE certification test questions as a culminating assessment of learning.

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- Diagnose shock absorber anomaly.
- Wheel bearing service.
- Demonstrate lug nut/bolt torque values.
- Diagnose common brake system problems.
- Perform proper procedures for both manual and pressure bleeding of a brake system.

Unit Assignments:
C8.1 Describe how to maintain, diagnose, service, and repair hydraulic and power assist systems.
C8.2 Describe the function and operation of automatic and manual transmissions and transaxes.
C8.3 Diagnose, service, and repair disc brakes, drum brakes, antilock brakes, and other brake systems as developed.
C8.4 Diagnose, service, and repair steering and suspension systems.
C8.5 Interpret tire and rim sizing to select appropriate wheels and tires for vehicles.
C8.6 Maintain, diagnose, service, and repair under-vehicle systems and malfunctions.

Reading Standards for Literacy CTE Grade 9/10:
Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics.

Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.

Writing Standards for Literacy CTE Grade 9/10:
Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes

Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

● Identify major parts of steering systems.
● Explain the operating principles of steering systems.
● Explain the operations of four-wheel steering systems.
● Describe common steering system problems.
● Describe service and repair procedures for rack and pinion steering gear.
● Explain how to complete basic power steering tests.
● Explain the principles of wheel alignment.
● List the purpose of each wheel alignment setting.
● Describe the six characteristics of wheel alignment.
● Describe the use of different types of wheel alignment equipment.

● Cite the safety rules that should be followed when servicing the braking system.
● Service power steering belts, hoses, and fluid.
● Explain how to complete basic power steering tests.
● Replace shock absorbers.
● Remove and replace suspension springs.

As a summary of their learning, students will add the protocols for inspection to their notes and will write summary reflections, as assigned by their instructor, as a part of each segment of learning.

● Students will conduct research and will read a variety of informational articles on automotive drivetrain, steering, suspension, brake, and tire components and systems used in today’s transportation industry. They will research the systems and specific careers associated with a specialized career including educational requirements for certification. They will add this information to their portfolio. Students will culminate this experience by completing a resume and cover letter and will present their knowledge to a group of their peers and to industry experts, receiving feedback from at least one industry partner.
Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.

Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

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