

## Advanced Automotive Technology/Diesel

### COURSE OUTLINE

**1. Course Title:** Advanced Automotive Technology/Diesel

**2. CBEDS Title:** Automotive Mechanics, combination

**3. CBEDS Number:** 5655

**4. Job Titles:**

Automotive Service Technicians & Mechanic

Diesel Service Technicians & Mechanic

Heavy Vehicle & Mobile Equipment Service Technicians & Mechanic

Industrial Machinery Installation, Repair and Maintenance Worker

Precision Instrument & Equipment Repairer

Rail Transportation Technician & Mechanic

Small Engine Mechanic

Stationary Engineer and Boiler Operator

**5. Course Description:**

This course extends students' knowledge and skills gained in the Automotive Technology Diesel course. This course provides further knowledge and skills in topics such as: engine construction, brakes, suspension, steering, tires, electrical and engine performance. Students will also develop diagnostic skills using diagnostic equipment for automobiles and light trucks. Students will be expected to perform common repair tasks for automobiles and light trucks.

Student Outcomes and Objectives:

1. To develop safe shop work practices and become familiar with OSHA standards as they apply to the auto mechanics trade.
2. To become acquainted with the major and minor components of an automobile, including hybrid technology.
3. To learn the correct procedures of starting and completing an automotive job and the proper tools and equipment to use in these procedures.
4. To develop an understanding of the methods, materials, and other related technology of the auto mechanics trade.
5. To learn how to use manuals, schematics, and sketches.
6. To develop good judgment and sound repair practice.
7. To coordinate acquired skills for purposes of testing, diagnosing, and troubleshooting.
8. To learn the use of specialized equipment.
9. To learn the related trade information needed for a complete understanding of repair and servicing operations, including service management paperwork and procedures.
10. To gain entry-level knowledge and skills needed for job placement in the automotive or diesel fields.

### Pathway

Recommended Sequence	Courses
Introductory	Automotive Technology 1, 2
Skill Building	Automotive Technology 3, 4
Advanced Skill	Advanced Automotive Technology 5, 6

**6. Hours:** *Students receive up to 180 hours of classroom instruction.*

**7. Prerequisites:** Automotive Technology

**8. Date (of creation/revision):** July 2010

## 9. Course Outline

<b>COURSE OUTLINE</b>				
Upon successful completion of this course, students will be able to demonstrate the following skills necessary for entry-level employment.				
<b>Instructional Units and Competencies</b>	<b>Course Hours</b>	<b>Model Curr. Standards</b>	<b>CA Academic Content Standards</b>	<b>CAHSEE</b>
<p><b>I. CAREER PREPARATION STANDARDS</b></p> <p><b>A. Career Planning and Management.</b></p> <ol style="list-style-type: none"> <li>1. Know the personal qualifications, interests, aptitudes, knowledge, and skills necessary to succeed in careers.               <ol style="list-style-type: none"> <li>a. Students will identify skills needed for job success</li> <li>b. Students will identify the education and experience required for moving along a career ladder.</li> </ol> </li> <li>2. Understand the scope of career opportunities and know the requirements for education, training, and licensure.               <ol style="list-style-type: none"> <li>a. Students will describe how to find a job.</li> <li>b. Students will select two jobs in the field and map out a timeline for completing education and/or licensing requirements.</li> </ol> </li> <li>3. Develop a career plan that is designed to reflect career interests, pathways, and postsecondary options.               <ol style="list-style-type: none"> <li>a. Students will conduct a self—assessment and explain how professional qualifications affect career choices.</li> </ol> </li> <li>4. Understand the role and function of professional organizations, industry associations, and organized labor in a productive society.               <ol style="list-style-type: none"> <li>a. Contact two professional organization and identify the steps to become a member.</li> </ol> </li> <li>5. Understand the past, present and future trends that affect careers, such as technological developments and societal trends, and the resulting need for lifelong learning.               <ol style="list-style-type: none"> <li>a. Students will describe careers in the transportation industry sector.</li> <li>b. Students will identify work-related cultural differences to prepare for a global workplace.</li> </ol> </li> <li>6. Know the main strategies for self-promotion in the hiring process, such as completing job applications, resume writing, interviewing skills, and preparing a portfolio.               <ol style="list-style-type: none"> <li>a. Students will write and key a resume, cover letters, thank you letters, and job applications.</li> <li>b. Students will participate in mock job interviews.</li> </ol> </li> </ol> <p><b>B. Technology.</b></p> <ol style="list-style-type: none"> <li>1. Understand past, present and future technological advances as they relate to a chosen pathway.</li> <li>2. Understand the use of technological resources to gain access to, manipulate, and produce information, products and services.</li> <li>3. Understand the influence of current and emerging technology on selected segments of the economy.</li> <li>4. Use appropriate technology in the chosen career pathway.</li> </ol> <p><b>C. Problem solving and Critical Thinking.</b></p> <ol style="list-style-type: none"> <li>1. Apply appropriate problem-solving strategies and critical thinking to work-related issues and tasks.</li> <li>2. Understand the systematic problem-solving models that incorporate input, process, outcome and feedback components.</li> </ol>	<p>15</p> <p>Additional hours are integrated throughout the course.</p>	<p>Transportation Industry Sector, Model Curriculum Standards</p> <p>3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0</p>	<p><u>Language Arts</u> (8) R 1.3, 2.6 W1.3, 2.5, LC 1.4,1.5 1.6 LS1.2, 1.3, (9/10) R2.1,2.3,2 W2.5 LC1.4 LS 1.1, 2.3 (11/12) R2.3 W2.5 LC1.2 <u>Math</u> (7) NS1.2, 1.7 MR 1.1,1.3 2.7,2.8, 3.1</p>	<p><b>Lang. Arts R 8.2.1 (9/10) R 2.1, 2.3 W2.5 Math (7) NS 1.2, 1.3, 1.7 MR 1.1, 2.1, 3.1</b></p>

<ul style="list-style-type: none"> <li>3. Use critical thinking skills to make informed decisions and solve problems.</li> <li>4. Apply decision-making skills to achieve balance in the multiple roles of personal, home, work and community life.</li> </ul> <p>D. Health and Safety.</p> <ul style="list-style-type: none"> <li>1. Know policies, procedures, and regulations regarding health and safety in the workplace, including employers' and employees' responsibilities.</li> <li>2. Understand critical elements of health and safety practices related to storing, cleaning and maintaining tools, equipment, and supplies.</li> </ul> <p>E. Responsibility &amp; Flexibility.</p> <ul style="list-style-type: none"> <li>1. Understand the qualities and behaviors that constitute a positive and professional work demeanor.</li> <li>2. Understand the importance of accountability and responsibility in fulfilling personal, community, and workplace roles.</li> <li>3. Understand the need to adapt to varied roles and responsibilities.</li> <li>4. Understand that individual actions can affect the larger community.</li> </ul> <p>F. Ethics and Legal Responsibilities</p> <ul style="list-style-type: none"> <li>1. Know the major local, district, state, and federal regulatory agencies and entities that affect the industry and how they enforce laws and regulations.</li> <li>2. Understand the concept and application of ethical and legal behavior consistent with workplace standards. <ul style="list-style-type: none"> <li>a. Contact a business and obtain a copy of their rules for employment.</li> <li>b. Role play difference ethical scenarios.</li> </ul> </li> <li>3. Understand the role of personal integrity and ethical behavior in the workplace.</li> </ul> <p>G. Leadership and Teamwork.</p> <ul style="list-style-type: none"> <li>1. Understand the characteristics and benefits of teamwork, leadership, citizenship in the school, community, and workplace settings.</li> <li>2. Understand the ways in which professional associations, such as SkillsUSA, ASE, NATEF, and competitive career development activities enhance academic skills, career choices, and contribute to promote employability.</li> <li>3. Understand how to organize and structure work individually and in teams for effective performance and attainment of goals.</li> <li>4. Know multiple approaches to conflict resolution and their appropriateness for a variety of situations in the workplace.</li> <li>5. Understand how to interact with others in ways that demonstrate respect for individual and cultural differences and for the attitudes and feelings of others.</li> </ul>				
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Instructional Units and Competencies	Hours	Industry Standards.	CA Academic Standards	CAHSEE
<p>I. Safety</p> <p>A. Personal</p> <ol style="list-style-type: none"> <li>1. Eye &amp; ear safety</li> <li>2. OSHA Regulations</li> </ol> <p>B. Tools</p> <ol style="list-style-type: none"> <li>1. Power</li> <li>2. Hand</li> </ol> <p>C. Equipment</p> <ol style="list-style-type: none"> <li>1. Lifts</li> <li>2. Jacks</li> <li>3. Drill press/grinders</li> <li>4. Cleaning Equipment</li> </ol> <p>D. Hazardous Material -MSDA</p> <ol style="list-style-type: none"> <li>1. Oil</li> <li>2. Coolant</li> <li>3. Gasoline</li> </ol>	20	<p>Transportation Industry Sector Vehicle Maintenance Service &amp; Repair Pathway</p> <p>C1.0, 1.2, 1.5 C2.0, 2.2, 2.3, 2.5 C3.0, 3.1</p>	<p>ELA 9-10; LS; 1.1 &amp; 1.6 ELA 9-10; R; 2.1, 2.2 S. 6; 3b Founda-tion Std.s. 1.1M (1.2), (1.3) G(1.1), (2.4)</p>	<p><b>(7) NS</b> <b>1.2, 1.3</b> <b>(7)MR</b> <b>2.1, 3.3</b></p>
<p>II. Measuring Devices</p> <p>A. Conversions</p> <ol style="list-style-type: none"> <li>1. Inches to decimals</li> <li>2. Decimals to inches</li> </ol> <p>B. Scales</p> <ol style="list-style-type: none"> <li>1. 1/64 to 1</li> </ol> <p>C. Micrometers</p> <ol style="list-style-type: none"> <li>1. Inside</li> <li>2. Outside</li> <li>3. Dial indicators</li> </ol> <p>D. Temperature Control</p>	10			
<p>III. Engine Construction (Upper End)</p> <p>A. Types of cylinder heads</p> <p>B. Types of valve trains</p> <p>C. Specification for a cylinder head</p> <ol style="list-style-type: none"> <li>1. Valves</li> <li>2. Valve Guides</li> <li>3. Valve Face</li> <li>4. Valve Seat</li> </ol> <p>D. Checking condition of the cylinder head</p> <ol style="list-style-type: none"> <li>1. Warpage</li> <li>2. Cracks</li> </ol> <p>E. Diagnostic techniques &amp; scenarios</p>	20			

Instructional Units and Competencies	Hours	Industry Standards.	CA Academic Standards	CAHSEE
IV. Engine Construction (Lower End) <ul style="list-style-type: none"> <li>A. Block construction</li> <li>B. Type of material</li> <li>C. Specification</li> <li>D. Cylinder arrangement</li> <li>E. Cylinder measurement</li> <li>F. Crank measurement</li> <li>G. Bearing clearance</li> <li>H. Oiling system</li> <li>I. Inspection &amp; Measuring</li> </ul>	20	Transportation Industry Sector Foundation Standards 10.5  Vehicle Maintenance Service & Repair Pathway B5.0 C3.0, 3.1 C6.0 C8.2, 8.3	ELA 9-10; R; 2.1, 2.2  S. 9-12; Physics; 1.d, f, g S. 9-12; Physics; 2h	<b>M. 7; MG; 1.2, 1.3, 2.4</b>
V. Hybrid Technology <ul style="list-style-type: none"> <li>A. Operate, maintain, and troubleshoot</li> <li>B. Perform and document repairs</li> </ul>	7			
VI. Brakes <ul style="list-style-type: none"> <li>A. Theory</li> <li>B. Types of brakes               <ul style="list-style-type: none"> <li>1. Drum</li> <li>2. Disc</li> <li>3. ABS</li> </ul> </li> <li>C. Repair               <ul style="list-style-type: none"> <li>1. Shop brake equipment</li> <li>2. Inspect hydraulic system</li> <li>3. Inspect brake parts</li> <li>4. Cleaning brakes</li> <li>5. R&amp;R shoes</li> <li>6. R&amp;R pads</li> <li>7. Turn rotor drums</li> </ul> </li> </ul>	15			
VII. Suspension <ul style="list-style-type: none"> <li>A. Theory</li> <li>B. Types               <ul style="list-style-type: none"> <li>1 Coil</li> <li>2 Leaf</li> <li>3 MacPherson</li> <li>4 Air</li> </ul> </li> <li>C. Alignment               <ul style="list-style-type: none"> <li>1 Theory</li> <li>2 Terminology</li> </ul> </li> <li>D. Service &amp; Inspection</li> </ul>	15			

Instructional Units and Competencies	Hours	Industry Standards.	CA Academic Standards	CAHSEE
<p>VIII. Steering</p> <p>A. Types</p> <ol style="list-style-type: none"> <li>1. Manual</li> <li>2. Power</li> <li>3. Rack Pinion</li> </ol> <p>B. Service &amp; Inspection</p>	10	Vehicle Maintenance Service & Repair Pathway C7.1, 7.3, 7.4, 7.6, 7.7 C8.3, 8.4	S. 9-12; Physics; 1.d, f, g 3b 5a, b, c S. 8; 5c S. 9-12; Chem.;	<b>M. 7; MG; 1.2, 1.3, 2.4</b>
<p>IX. Power Train Service</p> <p>A. Parts</p> <p>B. Theory</p> <p>C. Servicing</p> <ol style="list-style-type: none"> <li>1. Manual</li> <li>2. Automatic</li> </ol> <p>D. Using proper fluids according to manufacture's specifications</p> <p>E. Diagnostic Techniques &amp; Scenarios</p>	15		4a, c, d, 6a, b, c	
<p>X. Electrical</p> <p>A. Theory of electricity</p> <p>B. Wiring system</p> <p>C. Charging system</p> <p>D. Basic wire diagram reading</p> <p>E. Service</p> <ol style="list-style-type: none"> <li>1. Basic electrical problems               <ol style="list-style-type: none"> <li>i. Lights</li> <li>ii. Charging system</li> <li>iii. Starting system</li> <li>iv. Wiring</li> </ol> </li> </ol> <p>F. Troubleshooting</p> <p>G. Accessories</p>	15			
<p>XI. Engine Performance</p> <p>A. Types of ignition systems</p> <p>B. Theory</p> <ol style="list-style-type: none"> <li>1. Engine Control (Power control module)</li> </ol> <p>C. Terminology</p> <p>D. Fuel system</p> <p>E. Emission systems</p> <p>F. Air intake systems</p> <p>G. Service</p> <ol style="list-style-type: none"> <li>1. Drivability</li> <li>2. Scan tools</li> <li>3. Scopes</li> </ol>	15			

Instructional Units and Competencies	Hours	Industry Standards.	CA Academic Standards	CAHSEE
<p>XII. Industry-Accepted Maintenance Documentation</p> <p>A. Interpret reference materials in print and on line.</p> <p>B. Complete a work order including customer information and description of repairs.</p> <p>C. Demonstrate how to properly document maintenance procedures in accordance with applicable laws &amp; regulations</p> <p>D. Operate a mock repair shop</p> <ol style="list-style-type: none"> <li>1. Utilize "Write It Right" handbook</li> <li>2. Demonstrate good Customer Service</li> <li>3. Prepare estimates</li> <li>4. Demonstrate proper attitude</li> <li>5. Exhibit good shop management skills</li> </ol>	15	Vehicle Maintenance Service & Repair Pathway  C4.3, 4.4	1.1M (1.2), (1.3), (2.1) 2.0C 2.1 (2.1), (2.6) 2.0C 2.3 (1.4) 2.0 C 2.4 (2.4), (1.8) 6.0	<b>(10)Wa</b> <b>1.1</b> <b>(8)R2.1</b> <b>(10)WS</b> <b>1.2</b> <b>(7)NS1.</b> <b>2, 1.3,</b> <b>1.6, 1.7</b>

10. Additional recommended/optional items

a. Articulation: None

b. Academic credit: None

c. Instructional strategies:

Methods of Instruction:

a. Lecture

b. Audio Visual Materials

c. Research Readings and Written Presentations

d. Homework Assignments

e. Demonstrations

f. Group & Individual Projects

g. Quizzes, Tests, Performance Evaluations & Final Exam

h. Guest Speakers

i. Internet Exploration

d. Instructional materials: Write It Right: A Guide for Automotive Repair Dealers. Bureau of Automotive Repair, California Department of Consumer Affairs, Sacramento, CA

e. Certificates: None