LAUSD UNIFIED Division of Adult and Career Education

Career Technical Education (CTE) Course Outline

Course Title:	Auto Tech: Diesel/1
Course Number:	79-90-55
Date:	July 2025
Industry Sector:	Transportation
Pathway:	Systems Diagnostics and Service
CBEDS Title:	Diesel Equipment Mechanics
CBEDS Code:	5657
CalPADS	8530
Credits:	10

Hours:

Total
150

Course Description:

This competency-based course is one in a sequence of three courses designed to meet the Automotive Service Excellence (ASE) Program Certification Standards. It provides students with technical instruction and practical experience with diesel engines incorporating sustainable and green vehicle technologies. Instruction includes an introduction, safety, resource management, trade mathematics, service manuals/computer based info system, tools and equipment, basic principles of diesel, electronic control unit injectors, general diagnosis and repair, cylinder head and valve train, engine block, and employability skills and resume preparation. The competencies in this course are aligned with the California Common Core Standards and the California Career Technical Education Model Curriculum Standards.

Prerequisites:	Enrollment requires successful completion of the Technology/1 & 2: Automotive Systems (79-90-83 and 79-90-85) courses or equivalent experience in the field as verified by the instructor.
NOTE:	For Perkins purposes this course has been designated as an **introductory** course. This course **cannot** be repeated once a student receives a Certificate of Completion.
A-G Approval	N/A
Methods of Instruction:	Lecture and discussion, multimedia presentations, visual aids, projects individualized instruction, shop work
Student Evaluation:	Summative: End of section assessments
Industry Certification:	Bureau of Automotive Repair: Brake & Lamp Inspector
Recommended Texts:	Mack, James P. & Daniels, Jason A. Diesel Engine Technology Fundamentals, Service, Repair, 9th Edition, Goodheart-Wilcox, 2020.
Link to Resource Folder	https://bit.ly/autotechdiesel1resources

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
A. INTRODUCTION Understand, apply, and evaluate classroom and workplace policies and procedures.	1. Discuss the scope and purpose of the course. 2. Discuss the classroom policies and procedures. 3. Discuss and demonstrate Zoom, Schoology, basic computer skills, and practice safe, legal, and responsible use of digital media. 4. Assess students' basic knowledge in diesel engines. 5. Discuss, identify, research, and draw conclusions about different career paths, occupations, employment outlook, and career advancements in the transportation industry sector which impact the automotive industry. 6. Discuss opportunities available for promoting gender equity and the representation of non-traditional populations in the automotive industry. 7. Explain and recognize the importance of ethics, teamwork, respect of individual and cultural differences, and diversity in the workplace. 8. Describe the role of the Automotive Service of Excellence (ASE) as it applies to the automotive industry. 9. Describe the role of the Automotive Service Education Foundation (ASEF) in auto technician training.	**Career Ready Practice:** 1, 2, 3, 4, 5, 7, 8, 9, 10, 11 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5, 2.6 Career Planning & Management: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.9 Technology: 4.1, 4.2, 4.5 Problem Solving & Critical Thinking: 5.4 Responsibility & Flexibility: 7.2 Ethics & Legal Responsibilities: 8.3, 8.4, 8.5 Leadership & Teamwork: 9.1, 9.6, 9.7 Technical Knowledge & Skills: 10.1, 10.2 Demonstration & Application: 11.1, 11.2

(2 hours)		**CTE Pathway:** C5.4
B. SAFETY - GENERAL Understand safety procedures and techniques in the auto repair and maintenance sector.	1. Discuss classroom and workplace first aid, emergency procedures, accidents, and injury prevention. 2. Discuss the California Occupational Safety and Health Administration (Cal/OSHA) workplace requirements for auto diesel technicians to maintain a safe and healthy working environment. 3. Discuss the impact of the Environmental Protection Agency (EPA) legislation on the Transportation Industry Sector practices in protecting and preserving the environment. 4. Describe and demonstrate ASEF standards regarding proper handling, storage, and disposal of chemicals and materials used in an auto shop. 5. Discuss the impact of California Air Resources Board (ARB) legislation on the Transportation Industry Sector. 6. Discuss the Bureau of Automotive Repair (BAR) standards for consumer and environmental protection. 7. Discuss and practice the use, understand the information, and be responsible for the Safety Data Sheet (SDS) as it applies to the automotive industry. 8. Discuss the safety items required by federal, state, and local regulations. 9. Discuss the importance of proper personal hygiene in the classroom and auto shop. 10. Describe and demonstrate standards regarding proper use of protective equipment in an auto shop: a. clothing and gloves b. respiratory gear c. eye gear d. work shoes e. ventilation f. proper use of tools and equipment	**Career Ready Practice:** 1, 2, 4, 5, 7, 10, 12 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.2 Problem Solving & Critical Thinking: 5.1, 5.4 Health & Safety: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 Responsibility & Flexibility: 7.2, 7.7 Technical Knowledge & Skills: 10.1, 10.2 Demonstration & Application: 11.1 **CTE Pathway:** C1.1, C1.2, C1.3, C1.4, C2.2, C2.3, C2.5, C4.2, C5.2

(3 hours)	11. Demonstrate proper handling, storage, and disposal of chemicals and hazardous materials used in an auto shop. 12. Practice personal safety when lifting, bending, or moving equipment and supplies. 13. Pass the Safety Test with 100% accuracy.	
C. RESOURCE MANAGEMENT Understand, apply, and evaluate the resource management principles and techniques in the auto repair and maintenance field. (1 hour)	1. Define and describe the benefits of the following: a. resources b. management c. sustainability d. profitability e. company growth 2. Describe and list specific examples of the effective management of the following resources in the auto shop repair and maintenance business: a. time b. materials c. personnel 3. Pass a Resource Management assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 7 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Responsibility & Flexibility: 7.1, 7.2, 7.4 Technical Knowledge & Skills: 10.1 **CTE Pathway:** C5.1, C5.3
D. TRADE MATHEMATICS Understand, apply, and evaluate the mathematical requirements used in auto diagnosis, maintenance, and the repair field.	1. Define and identify the practical math terminology in auto repair and maintenance. 2. Describe, demonstrate, and ask questions regarding problem-solving techniques involving: a. basic trade mathematical operations b. changing fractions to decimals c. changing decimals to fractions d. engineering notation 3. Describe, demonstrate, and interpret the English and metric units of the measuring system; draw conclusions to make informed decisions.	**Career Ready Practice:** 1, 2, 5, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Problem Solving & Critical Thinking: 5.1, 5.2, 5.4

(2 hours)	4. Describe and demonstrate problem-solving techniques: a. using algebra b. using percentages c. using algebra (angles and degrees) d. for reading and interpreting graphs e. when using a calculator 5. Pass a Trade Mathematics assessment with an 80% score or higher.	Technical Knowledge & Skills: 10.1 Demonstration & Application: 11.1 **CTE Pathway:** C2.2, C2.3, C2.4, C2.5
E. SERVICE MANUALS AND COMPUTER-BASED INFORMATION SYSTEMS Understand, apply, and evaluate the contents of service manuals and computer-based information systems as important sources of reference according to manufacturer specifications.	1. Identify the different types of service manuals. 2. State the different types of information that can be found in service manuals, such as specifications, troubleshooting charts, and repair information. 3. Describe and demonstrate the use of service manuals. 4. Work in teams to describe and demonstrate the use of web-based search engines to find automotive technical information. 5. Complete a work order to include customer information, vehicle identifying information, customer concerns, related service history, cause, and correction. 6. Complete a Preventative Maintenance Inspection Sheet that includes bumper-to-bumper visual inspection. 7. Pass a Service Manual And Computer-Based Information Systems assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4, 5, 9, 10, 11 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.1, 4.2, 4.4, 4.5 Problem Solving & Critical Thinking: 5.2, 5.3, 5.4 Leadership & Teamwork: 9.7 Technical Knowledge & Skills: 10.1 Demonstration & Application: 11.1 **CTE Pathway:** C2.6, C4.3, C4.4

(2 hours)		
F. TOOLS AND EQUIPMENT Understand, apply, and evaluate the policies and procedures for using brake diagnostic, maintenance, and repair tools and equipment. (8 hours)	1. Define, discuss, and demonstrate the proper use, maintenance, and storage techniques for the following specialty tools and equipment for diesel engines: a. connector pick tool set b. ball/small hole gauges c. cooling system vacuum fill machine (optional) d. dial bore gauge or telescoping gauges e. engine stands f. fan hub wrenches g. injector removal tool(s) h. liner installer (Universal) i. liner puller (Universal) j. precision straight edge k. protrusion gauge (cylinder liner height) l. ring compressor m. ring expander(s) n. rod bolt protectors o. soft jaw vise or adapters p. valve spring compressor q. vibration damper puller r. fifth wheel test pin s. stopwatch t. tire square u. trailer cord tester v. tachometer w. compression tester x. cylinder leakage tester y. engine vacuum gauge 2. Explain and demonstrate the following: a. selection of the appropriate hand, power tools, and equipment by job b. procedures for checking out hand, power tools, and equipment from the tool room c. safe use of the most common hand, power tools and equipment in the auto shop d. practicing personal safety when lifting, bending, or moving equipment and supplies 3. Pass a Tools and Equipment assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.2 Health & Safety: 6.3, 6.4, 6.6 Technical Knowledge & Skills: 10.1 Demonstration & Application: 11.1 **CTE Pathway:** C1.4, C2.1, C2.2, C2.3

G. BASIC PRINCIPLES OF DIESEL Understand and evaluate the basic principles of diesel operation and fuel. (4 hours)	1. Define and explain diesel theory. 2. Identify characteristics of diesel fuel and its impact on the environment. 3. Explain the difference between diesel fuel, compressed natural gas (CNG), liquified natural gas (LNG), and gasoline. 4. Describe various combustion chamber designs. 5. Describe and research the different types of fuel supply systems. 6. Describe high pressure fuel systems (common rail). 7. Pass a Basic Principles of Diesel assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4, 11, 12 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.2, 4.5 Technical Knowledge & Skills: 10.1 **CTE Pathway:** C1.5, C3.1
H. ELECTRONIC CONTROL UNIT INJECTORS Understand, apply, and evaluate the operation and testing techniques for electronic control unit injectors.	1. Define and describe the electronic control unit injectors and its impact on the environment. 2. Explain the operation of the electronic fuel system: a. Electronic Control Module (ECM) b. sensors (speed, oil pressure, cooling sensors, etc.) c. wiring harnesses and connectors 3. Explain and demonstrate how to diagnose to solve electronic fuel system repairs, faults, and failures. 4. Explain and form groups on how to troubleshoot the electronic fuel system to make informed decisions. 5. Pass an Electronic Control Unit Injectors assessment with an 80% score or higher.	**Ready Practice:** 1, 2, 4, 5, 9, 10, 12 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.2 Problem Solving & Critical Thinking: 5.1, 5.2, 5.3, 5.4 Leadership & Teamwork: 9.7 Technical Knowledge & Skills:

(4 hours)		10.1 Demonstration & Application: 11.1 **CTE Pathway:** C1.5, C6.3, C6.4, C8.6
I. GENERAL DIAGNOSIS AND REPAIR Understand, apply, and evaluate the general diagnostic and repair techniques for diesel engines using scanners, laptops, and onboard diagnostics according to manufacturer specifications. (30 hours)	1. Inspect fuel, oil, coolant levels, and condition; determine needed action. 2. Identify causes of engine fuel, oil, coolant, air, and other leaks; use reference books or technical manuals to determine needed action. 3. Demonstrate how to listen for engine noises; determine needed action. 4. Observe engine exhaust smoke color and quantity; determine needed action. 5. Identify causes of no cranking, cranking but failing to start, hard starting, and starting but not continuing to run problems; determine needed action. 6. Identify causes of surging, rough operation, misfiring, low power, slow deceleration, slow acceleration, and shutdown problems; determine needed action. 7. Identify engine vibration problems; determine needed action. 8. Work in teams to research faults by use of scanners, laptops, and onboard diagnostics to: a. check and record electronic diagnostic codes b. check and record trip/operational data c. monitor electronic data parameters d. clear codes e. determine further diagnosis 9. Pass a General Diagnosis and Repair assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4, 5, 9, 10, 11 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.2 Problem Solving & Critical Thinking: 5.1, 5.2, 5.3, 5.4 Leadership & Teamwork: 9.7 Technical Knowledge & Skills: 10.1 Demonstration & Application: 11.1 **CTE Pathway:** C2.1, C2.3, C3.1, C3.7, C4.3, C6.3, C7.1, C7.7

J. CYLINDER HEAD AND VALVE TRAIN Understand, apply, and evaluate diagnostic, maintenance, and repair techniques for the cylinder head and valve train according to manufacturer specifications. (40 hours)	1. Remove, clean, inspect for visible damage, and replace cylinder head(s) assembly. 2. Clean and inspect threaded holes, studs, and bolts for serviceability; determine needed action. 3. Demonstrate how to inspect cylinder head for cracks/damage; check mating surfaces for warpage; check condition of passages; inspect core/expansion and gallery plugs; use special tools to disassemble cylinder head; determine needed action. 4. Work in teams to disassemble head and inspect valves, guides, seats, springs, retainers, rotators, locks, and seals; determine needed action. 5. Measure valve head height relative to deck and valve face-to-seat contact; determine needed action. 6. Inspect injector sleeves and seals; measure injector tip or nozzle protrusion; determine needed action. 7. Inspect valve train components; determine needed action. 8. Reassemble cylinder head. 9. Inspect, measure, and replace/reinstall overhead camshaft; measure/adjust end play and backlash. 10. Inspect cam followers; determine needed action. 11. Adjust valve bridges (crossheads); adjust valve clearances, injectors, and engine brake; use reference books or manuals to identify service limits. 12. Pass a Cylinder Head and Valve Train assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4, 5, 7, 9, 10, 11 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.1, 4.2 Problem Solving & Critical Thinking: 5.2, 5.3, 5.4 Responsibility & Flexibility: 7.4 Leadership & Teamwork: 9.7 Technical Knowledge & Skills: 10.1 Demonstration & Application: 11.1 **CTE Pathway:** C2.2, C2.3, C2.5, C2.6, C2.7, C4.3, C6.2
K. ENGINE BLOCK Understand, apply, and evaluate the diagnostic,	1. Perform and demonstrate a crankcase pressure test; determine needed action. 2. Demonstrate how to remove, inspect, service, and install pans, covers, gaskets, seals, wear rings, and crankcase ventilation components.	**Career Ready Practice:** 1, 2, 4, 5, 9, 10, 11

maintenance, and repair techniques for the engine block according to manufacturer specifications.	3. Demonstrate how to disassemble, clean, and inspect an engine block for cracks/damage; measure mating surfaces for warpage; check condition of passages, core/expansion and gallery plugs; inspect threaded holes, studs, dowel pins, and bolts for serviceability; determine needed action. 4. Demonstrate how to inspect cylinder sleeve counterbore and lower bore; check bore distortion; determine needed action. 5. Work in teams to clean, inspect, and measure cylinder walls or liners for wear and damage; determine needed action. 6. Replace/reinstall cylinder liners and seals; check and adjust liner height (protrusion); research limits to determine serviceability . 7. Inspect in-block camshaft bearings for wear and damage; determine needed action. 8. Inspect, measure, and replace/reinstall in-block camshaft; measure/adjust end play; use reference books or manuals for appropriate service limits. 9. Clean and inspect crankshaft for surface cracks and journal damage; check condition of oil passages; check passage plugs; measure journal diameter; determine needed action. 10. Inspect main bearings for wear patterns and damage; and replace as needed; check bearing clearances; check and correct crankshaft end play. 11. Inspect, install, and time gear train; measure gear backlash; determine needed action. 12. Inspect connecting rod and bearings for wear patterns; measure pistons, pins, retainers, and bushings; perform needed action. 13. Determine piston-to-cylinder wall clearance; check ring-to-groove fit and end gap; install rings on pistons. 14. Assemble pistons and connecting rods; install in block; install rod bearings and check clearances. 15. Check condition of piston cooling jets (nozzle); determine needed action. 16. Inspect and measure crankshaft vibration damper; determine needed action.	**CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.1, 4.2 Problem Solving & Critical Thinking: 5.3, 5.4 Leadership & Teamwork: 9.7 Technical Knowledge & Skills: 10.1 Demonstration & Application: 11.1 **CTE Pathway:** C2.1, C2.2, C2.3, C2.4, C2.5, C2.6, C2.7, C4.3

(50 hours)	17. Install and align flywheel housing, inspect flywheel housing(s) to transmission housing/engine mating surface(s), and measure flywheel housing face and bore runout; determine needed action. 18. Inspect flywheel/flex plate (including ring gear) and mounting surfaces for cracks and wear, and measure runout; determine needed action. 19. Pass an Engine Block assessment with an 80% score or higher.	
L. EMPLOYABILITY SKILLS AND RESUME PREPARATION Understand, apply, and evaluate the employability skills and résumé preparation desired of automotive technicians.	1. Understand and define employer requirements for soft skills to include: a. attitude toward work b. communication and collaboration c. critical thinking, problem solving, and decision-making d. customer service e. diversity in the workplace f. flexibility and adaptability g. interpersonal skills h. leadership and responsibility i. punctuality and attendance j. quality of work k. respect, cultural and diversity differences l. teamwork m. time management n. trust and ethical behavior o. work ethic 2. Develop a career plan that reflects career interests, pathways, and post-secondary options. 3. Create/revise a résumé, cover letter, and/or portfolio. 4. Demonstrate, analyze, research, and review the role of online job searching platforms and career websites to make informed decisions.	**Career Ready Practice:** 1, 2, 3, 4, 5, 7, 8, 9, 10, 11 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.4, 2.5 Career Planning & Management: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.8, 3.9 Technology: 4.1, 4.2, 4.3, 4.5 Problem Solving & Critical Thinking: 5.1, 5.4 Responsibility & Flexibility: 7.2, 7.3, 7.4, 7.7 Ethics & Legal Responsibilities: 8.3, 8.4, 8.5 Leadership & Teamwork:

(4 hours)	5. Understand the importance of assessing social media account content for professionalism. 6. Demonstrate and complete and/or review an on-line job application. 7. Understand and demonstrate interview skills to get the job to include: a. do's and don'ts for job interviews b. how to dress for the job 8. Demonstrate and create sample follow-up letters. 9. Understand the importance of the continuous upgrading of job skills as it relates to: a. certification, licensure, and/or renewal b. professional organizations/events c. industry associations and/or organized labor	9.1, 9.2, 9.3, 9.4, 9.6, 9.7 Technical Knowledge & Skills: 10.1, 10.3 Demonstration & Application: 11.1, 11.2, 11.5 **CTE Pathway:** C5.4, C5.5

ACKNOWLEDGEMENTS

Thanks to the following individuals for their contributions in developing and editing this curriculum:

Ana Martinez, Allen Cochran, Victor Lerma, Tom Sawicki

Approved by: Renny L. Neyra, Executive Director