LAUSD UNIFIED Division of Adult and Career Education

Career Technical Education (CTE) Course Outline

Course Title:	Auto Tech: Diesel/3: Drive Train
Course Number:	79-90-59
Date:	July 2025
Industry Sector:	Transportation
Pathway:	Systems Diagnostics and Service
CBEDS Title:	Diesel Equipment Mechanics
CBEDS Code:	5657
CalPADS	8532
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, clutch, transmission, driveshaft and universal joints, drive axle, air brakes, employability skills and resume preparation, and entrepreneurial skills. 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 Auto Tech: Diesel/2 (79-90-57) course.
NOTE:	For Perkins purposes this course has been designated as a **capstone** 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:	Bennett, Sean. Heavy Duty Truck System, 7th Edition, Cengage Learning, 2020.
Link to Resource Folder	https://bit.ly/autotechdiesel3resources

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
A. INTRODUCTION REVIEW Understand, apply, and evaluate classroom and workplace policies and procedures.	1. Review the scope and purpose of the course. 2. Review the classroom policies and procedures. 3. Review and demonstrate Zoom, Schoology, basic computer skills, and practice safe, legal, and responsible use of digital media. 4. Review students' basic knowledge in diesel engines. 5. Review, 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. Review opportunities available for promoting gender equity and the representation of non-traditional populations in the automotive industry. 7. Review and recognize the importance of ethics, teamwork, respect of individual and cultural differences, and diversity in the workplace. 8. Review the role of the Automotive Service of Excellence (ASE) as it applies to the automotive industry. 9. Review 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:

(2 hours)		11.1, 11.2 **CTE Pathway:** C5.4
B. SAFETY – GENERAL REVIEW Understand safety procedures and techniques in the auto repair and maintenance sector.	1. Review classroom and workplace first aid, emergency procedures, accidents, and injury prevention. 2. Review the California Occupational Safety and Health Administration (Cal/OSHA) workplace requirements for auto diesel technicians to maintain a safe and healthy working environment. 3. Review the impact of the Environmental Protection Agency (EPA) legislation on the Transportation Industry Sector practices in protecting and preserving the environment. 4. Review and demonstrate ASEF standards regarding proper handling, storage, and disposal of chemicals and materials used in an auto shop. 5. Review the impact of California Air Resources Board (ARB) legislation on the Transportation Industry Sector. 6. Review the Bureau of Automotive Repair (BAR) standards for consumer and environmental protection. 7. Review and practice the use, understand the information, and be responsible for the Safety Data Sheet (SDS) as it applies to the automotive industry. 8. Review the safety items required by federal, state, and local regulations. 9. Review the importance of proper personal hygiene in the classroom and auto shop. 10. Review 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. Review 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 REVIEW Understand, apply, and evaluate the resource management principles and techniques in the auto repair and maintenance field. (1 hour)	1. Review and describe the benefits of the following: a. resources b. management c. sustainability d. profitability e. company growth 2. Review 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 REVIEW Understand, apply, and evaluate the mathematical requirements used in auto diagnosis, maintenance, and the repair field.	1. Review and identify the practical math terminology in auto repair and maintenance. 2. Review, 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. Review, demonstrate, and interpret the English and metric units of the measuring	**Career Ready Practice:** 1, 2, 5, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Problem Solving & Critical Thinking:

(2 hours)	system; draw conclusions to make informed decisions. 4. Review 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.	5.1, 5.2, 5.4 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 REVIEW Understand, apply, and evaluate the contents of service manuals and computer-based information systems as important sources of reference according to manufacturer specifications.	1. Review the different types of service manuals. 2. Review the different types of information that can be found in service manuals, such as specifications, troubleshooting charts, and repair information. 3. Review 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:

(2 hours)		11.1 **CTE Pathway:** C2.6, C4.3, C4.4
F. TOOLS AND EQUIPMENT REVIEW Understand, apply, and evaluate the policies and procedures for using brake diagnostic, maintenance, and repair tools and equipment.	1. Review, 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. Review 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	**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

(8 hours)	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.	
G. CLUTCH Understand and evaluate the diagnostic, maintenance, and repair techniques for clutches according to manufacturer specifications.	1. Demonstrate and identify causes of clutch noise, binding, slippage, pulsation, vibration, grabbing, dragging, and chatter problems; determine needed action. 2. Work in teams to inspect and adjust clutch linkage, cables, levers, brackets, bushings, pivots, springs, and clutch safety switch (including push and pull-type assemblies); check pedal height and travel; perform needed action. 3. Inspect, adjust, repair, or replace hydraulic clutch slave and master cylinders, lines, and hoses, bleed system. 4. Inspect, adjust, lubricate, or replace release (throw-out) bearing, sleeve, bushings, springs, housing, levers, release fork, fork pads, rollers, shafts, and seals. 5. Inspect, adjust, and replace single-disc clutch pressure plate and clutch disc. 6. Inspect, adjust, and replace two-plate clutch pressure plate, clutch discs, intermediate plate, and drive pins/lugs. 7. Work in teams to inspect and/or replace clutch brake assembly; inspect input shaft and bearing retainer; perform needed action. 8. Inspect, adjust, and replace self-adjusting/ continuous-adjusting clutch mechanisms. 9. Inspect and replace pilot bearing. 10. Inspect flywheel mounting area on crankshaft, rear main oil seal, and measure crankshaft end play; determine needed action. 11. Inspect flywheel, starter ring gear and measure flywheel face and pilot bore runout; determine needed action. 12. Inspect flywheel housing(s) to transmission housing/engine mating surface(s) and	**Career Ready Practice:** 1, 2, 4, 5, 9, 10 **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: 10.3 Demonstration & Application: 11.1 **CTE Pathway:** C2.2, C2.3, C2.4, C2.5, C2.7, C3.7, C4.3

(30 hours)	measure flywheel housing face and bore runout; determine needed action. 13. Pass a Clutch assessment with an 80% score or higher.	
H. TRANSMISSION Understand, apply, and evaluate the diagnostic, maintenance, and repair techniques for transmissions according to manufacturer specifications.	1. Identify causes of transmission noise, shifting, lockup, jumping-out-of-gear, overheating, and vibration problems; determine needed action. 2. Inspect, test, repair, or replace air shift controls, lines, hoses, valves, regulators, filters, and cylinder assemblies. 3. Work in teams to inspect and replace transmission mounts, insulators, and mounting bolts. 4. Inspect for leakage and replace transmission cover plates, gaskets, seals, and cap bolts; inspect seal surfaces and vents; repair as needed. 5. Demonstrate and check transmission fluid level and condition; determine needed service; add proper type of lubricant. 6. Inspect, adjust, and replace transmission shift lever, cover, rails, forks, levers, bushings, sleeves, detents, interlocks, springs, and lock bolts/safety wires. 7. Remove and reinstall transmission. 8. Inspect input shaft, gear, spacers, bearings, retainers, and slingers; determine needed action. 9. Inspect transmission oil filters and coolers; replace as needed. 10. Inspect speedometer components; determine needed action. 11. Inspect and adjust Power Take-Off (P.T.O.) assemblies, controls, and shafts; determine needed action. 12. Inspect and test function of reverse light, neutral start, and warning device circuits; determine needed action. 13. Inspect and test transmission temperature gauge and sensor/sending unit; determine needed action. 14. Inspect and test operation of automated mechanical transmission and manual	**Career Ready Practice:** 1, 2, 4, 5, 9, 10 **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: 10.3 Demonstration & Application: 11.1 **CTE Pathway:** C2.2, C2.3, C2.4, C2.5, C2.7, C3.7, C8.2

(30 hours)	electronic shift controls, shift, range, and splitter solenoids, shift motors, indicators, speed and range sensors, Electronic/Transmission Control Units (ECU/TCU), neutral/in gear and reverse switches, and wiring harnesses; determine needed action. 15. Inspect and test operation of automated mechanical transmission electronic shift selectors, air, and electrical switches, displays and indicators, wiring harnesses, and air lines; determine needed action. 16. Use appropriate diagnostic tools and procedures to diagnose automated mechanical transmission problems; check and record diagnostic codes, clear codes, and interpret digital multimeter (DMM) readings; determine needed action. 17. Pass a Transmission assessment with an 80% score or higher.	
I. DRIVESHAFT AND UNIVERSAL JOINTS Understand, apply, and evaluate the diagnostic, maintenance, and repair techniques for the driveshaft and universal joint according to manufacturer specifications.	1. Identify causes of driveshaft and universal joint noise and vibration problems; determine needed action. 2. Work in teams to inspect, service, or replace driveshaft, slip joints, yokes, drive flanges, and universal joints, driveshaft boots and seals, and retaining hardware, check phasing of all shafts. 3. Demonstrate and inspect driveshaft center support bearings and mounts; determine needed action. 4. Measure driveline angles; determine needed action. 5. Pass a Driveshaft and Universal Joints assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4, 5, 9, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.2 Problem Solving & Critical Thinking: 5.3, 5.4 Leadership & Teamwork: 9.7 Technical Knowledge & Skills: 10.3

(10 hours)		Demonstration & Application: 11.1 **CTE Pathway:** C2.2, C2.3, C2.4, C2.5, C2.7, C3.7, C8.6
J. DRIVE AXLE Understand, apply, and evaluate the diagnostic, maintenance, and repair techniques for the drive axle according to manufacturer specifications.	1. Identify causes of drive axle(s) drive unit noise and overheating problems; determine needed action. 2. Check and repair fluid leaks; inspect and replace drive axle housing cover plates, gaskets, sealants, vents, magnetic plugs, and seals. 3. Check drive axle fluid level and condition; determine needed service; add proper type of lubricant. 4. Work in teams to remove and replace differential carrier assembly. 5. Demonstrate, inspect, and replace differential case assembly including spider gears, cross shaft, side gears, thrust washers, case halves, and bearings. 6. Inspect and replace components of locking differential case assembly. 7. Inspect differential carrier housing and caps, side bearing bores, and pilot bearing bore; determine needed action. 8. Measure ring gear runout; determine needed action. 9. Inspect and replace ring and drive pinion gears, spacers, sleeves, bearing cages, and bearings. 10. Measure and adjust: a. drive pinion bearing preload b. drive pinion depth c. side bearing preload and ring gear backlash. 11. Check and interpret ring gear and pinion tooth contact pattern; determine needed action. 12. Inspect, adjust, or replace ring gear thrust block/screw.	**Career Ready Practice:** 1, 2, 4, 5, 9, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.2 Problem Solving & Critical Thinking: 5.3, 5.4 Leadership & Teamwork 9.7 Technical Knowledge & Skills: 10.3 Demonstration & Application: 11.1 **CTE Pathway:** C2.2, C2.3, C2.4, C2.5, C2.7, C3.7, C8.6

(30 hours)	13. Inspect power divider (inter-axle differential) assembly; determine needed action. 14. Inspect, adjust, repair, or replace air operated power divider (inter-axle differential) lockout assembly including diaphragms, seals, springs, yokes, pins, lines, hoses, fittings, and controls. 15. Inspect, repair, or replace drive axle lubrication system: pump, troughs, collectors, slingers, tubes, and filters. 16. Inspect and replace drive axle shafts. 17. Remove and replace wheel assembly; check rear wheel seal and axle flange gasket for leaks; perform needed action. 18. Identify causes of drive axle wheel bearing noise and check for damage; perform needed action. 19. Inspect and test drive axle temperature gauge and sending unit/sensor; determine needed action. 20. Clean, inspect, lubricate, and replace wheel bearings; replace seals and wear rings; inspect and replace retaining hardware; adjust drive axle wheel bearings. 21. Pass a Drive Axle assessment with an 80% score or higher.	
K. **AIR BRAKES** Perform various air-hydraulic and anti-lock brake repairs.	1. Explain the principles of air brakes. 2. Explain and demonstrate the functions of the air brake components in the supply, parking, and emergency circuits. 3. Check operation of the parking (spring) brake chamber; determine needed repairs and replace as needed. 4. Manually release and reset parking (spring) brakes in accordance with manufacturer recommendations. 5. Explain the various types of foundation and mechanical brakes and related components. 6. Work in teams to inspect, test, adjust, and service brake chambers, diaphragm, clamp, spring, pushrod, clevis, and mounting brackets; repair or replace as needed. 7. Check air system build up time; determine needed repairs.	**Career Ready Practice:** 1, 2, 4, 5, 9, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.2 Problem Solving & Critical Thinking: 5.3, 5.4 Leadership & Teamwork: 9.7

(25 hours)	8. Drain air reservoir tanks; check for oil, water, and foreign material; determine needed repairs. 9. Inspect, test, and service anti-lock brake system (ABS) air, electrical/electronic, and mechanical. 10. Observe anti-lock brake system (ABS) warning light at startup; determine if further diagnosis is needed. 11. Pass a Brakes assessment with an 80% score or higher.	Technical Knowledge & Skills: 10.1, 10.3 Demonstration & Application: 11.1 **CTE Pathway:** C2.2, C2.3, C2.4, C2.5, C3.7, C8.3, C8.6
L. EMPLOYABILITY SKILLS AND RESUME PREPARATION REVIEW Understand, apply, and evaluate the employability skills and resume preparation desired of automotive technicians.	1. Review 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. Review a career plan that reflects career interests, pathways, and post-secondary options. 3. Review/revise a resume, cover letter and/or portfolio. 4. Review and demonstrate, analyze, research, and review the role of online job	**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

(4 hours)	searching platforms and career websites to make informed decisions. 5. Review the importance of assessing social media account content for professionalism. 6. Review and demonstrate and complete and/or review an on-line job application. 7. Review and demonstrate interview skills to get the job: a. do's and don'ts for job interviews b. how to dress for the job 8. Review and demonstrate and create sample follow-up letters. 9. Review 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	Leadership & Teamwork: 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
M. ENTREPRENEURIAL SKILLS Understand, apply, and evaluate the process involved in becoming an entrepreneur in the automotive industry.	1. Review the definition of entrepreneurship. 2. Review and research the necessary characteristics of successful entrepreneurs. 3. Review personal goals prior to starting a business. 4. Review sources of monetary investment in a business opportunity. 5. Review licensing/permit requirements for a business. 6. Review how the Small Business Administration (SBA) assists entrepreneurs with lenders and funding to help them plan, start and grow a business. 7. Differentiate between sustainable and green business practices. 8. Review a budget to identify start-up expenses. 9. Pass an entrepreneurial skills assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4, 5, 10, 11, 12 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.2 Problem solving & Critical Thinking: 5.3, 5.4 Technical Knowledge & Skills: 10.1

(3 hours)		Demonstration & Application: 11.1 **CTE Pathway:** C5.1, C5.3

ACKNOWLEDGEMENTS

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

Ana Martinez, Allen Cochran, Victor Lerma, Tom Sawicki

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