LAUSD UNIFIED Division of Adult and Career Education

Career Technical Education (CTE) Course Outline

Course Title:	Technology/1: Automotive Systems
Course Number:	79-90-83
Date:	August 2024
Industry Sector:	Transportation
Pathway:	Systems Diagnostics and Service
CBEDS Title:	Intro to Automotive
CBEDS Code:	5652
Credits:	5

Hours:

Total
90

Course Description:

This competency-based course is the first in a sequence of two designed to introduce automotive systems. It provides students with project-based experiences in automotive technologies including alternative and green vehicle technology. Instruction includes an introduction, safety, resource management, measurements, tools and equipment, service manuals and computer-based information systems, electrical systems, brake systems, suspension and steering systems, engine repair systems, employability skills and resume preparation. The competencies in this course are aligned with the California High School Academic Content Standards and the California Career Technical Education Model Curriculum Standards.

Prerequisites:	Enrollment requires a 6th grade reading level as measured by the CASAS GOALS test.
NOTE:	For Perkins purposes, this course has been designated as an **introductory/concentrator** 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:	N/A
Recommended Texts:	Duffy, James E. Modern Automotive Technology, 10th Edition. Goodheart-Willcox Publishing, 2022. Johansson, Chris. Auto Fundamentals, 13th Edition, Goodheart-Willcox Publishing, 2024.
Link to Resource Folder	https://bit.ly/tech1autoresources Access to: Content Standards and resource links. Employer Advisory Board members

Approved by: Renny L. Neyra, Executive Director

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
A. INTRODUCTION Understand, apply, and evaluate classroom and workplace policies and procedures. (2 hours)	1. Discuss the scope and purpose of the course. 2. Discuss the classroom policies and procedures. 3. Discuss and demonstrate Zoom, Schoology, and basic computer skills. 4. Discuss, identify, research, and draw conclusions on the different career paths, occupations, employment outlook, and career advancements in the transportation industry sector which have an impact on vehicles. 5. Discuss the opportunities available for promoting gender equity and the representation of non-traditional populations in the automotive industry. 6. Explain and recognize the importance of ethics, teamwork, respecting individual and cultural differences, and diversity in the workplace. 7. Describe the role of the Automotive Service of Excellence (ASE) as it applies to the automotive industry. 8. Describe the role of the Automotive Service Education Foundation (ASEF) in auto technician training.	**Career Ready Practice:** 1, 2, 3, 4, 5, 8, 9, 10, 11 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Career Planning & Management: 3.1, 3.4, 3.5, 3.6, 3.9 Technology: 4.1, 4.5 Problem Solving & Critical Thinking: 5.4 Ethics & Legal Responsibilities: 8.2, 8.3, 8.4, 8.5 Leadership & Teamwork: 9.3, 9.4, 9.6 Demonstration & Application: 11.1, 11.2 **CTE Pathway:** C2.6
B. SAFETY - GENERAL Understand safety procedures and techniques in the auto	1. Discuss classroom and workplace procedures for first aid, emergencies, and accidents/ injury prevention. 2. Discuss the California Occupational Safety and Health Administration (Cal/OSHA) workplace	**Career Ready Practice:** 1, 2, 10, 12 **CTE Anchor:**

repair and maintenance sector. (3 hours)	requirements for auto technicians to maintain a safe and healthy working environment. 3. Discuss the impact of Environmental Protection Agency (EPA) legislation on 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 the use of the Safety Data Sheet (SDS) as it applies to the automotive industry. 8. Discuss the safety items required by the federal, state, and local regulations. 9. Discuss the importance of proper personal hygiene in the classroom and auto shop. 10. Describe and demonstrate the 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. handling, storage, and disposal of chemicals and hazardous materials used in an auto shop g. proper use of tools and equipment 11. Practice personal safety when lifting, bending, or moving equipment and supplies. 12. Pass the safety test with 100% accuracy.	Academics: 1.0 Communications: 2.1, 2.3 Health & Safety: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 Technical Knowledge & Skills: 10.2, 10.4 Demonstration & Application: 11.1 **CTE Pathway:** C1.2, C1.4, C2.2
C. RESOURCE MANAGEMENT Understand, apply, and evaluate the resource management principles and techniques in the auto repair and maintenance field.	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 effective management of the following resources in the auto shop repair and maintenance business: a. time b. materials	**Career Ready Practice:** 1, 2, 7 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3

(1 hour)	c. personnel 3. Pass a resource management assessment with an 80% score or higher.	Responsibility & Flexibility: 7.1, 7.4 Technical Knowledge & Skills: 10.1 **CTE Pathway:** C5.2
D. MEASUREMENTS Understand, apply, and evaluate the principles of precision measurement and the use of precision measuring instruments. (3 hours)	1. Take a measurement pre-test. 2. Identify and describe the features and functions of the following automotive measuring tools: a. steel ruler b. Vernier calipers c. combination square d. inside calipers e. outside calipers f. micrometer depth gauges g. telescoping gauges h. hole gauges i. plastic gauges 3. Describe and demonstrate the following: a. using of a conversion chart properly b. measuring to 1/64 inch with a steel ruler c. measuring to 1/100 inch with a steel ruler d. measuring to .5mm with a steel ruler e. measuring to .005 with micrometers f. measuring to 1/100mm with micrometers g. measuring to 1/1000 mm with Vernier calipers h. measuring to .05mm with Vernier calipers i. qualifying, setting up, and reading dial indicators 4. Describe, demonstrate, and interpret the English and metric units of the measuring system, and draw conclusions to make informed decisions. 5. Pass a measurement assessment with an 80% score or higher.	**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 Technical Knowledge & Skills: 10.1 Demonstration & Application: 11.1 **CTE Pathway:** C2.4
E. TOOLS AND EQUIPMENT Understand, apply, and evaluate the use, maintenance, and storage techniques for	1. Define, discuss, and demonstrate the proper use, maintenance, and storage techniques for the most common automotive hand tools. 2. Explain and demonstrate the following: a. selection of the appropriate hand, power tools, and equipment for each job	**Career Ready Practice:** 1, 2, 10 **CTE Anchor:** Academics:

automotive tools and equipment. (4 hours)	b. procedure 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. practice personal safety when lifting, bending, or moving equipment and supplies 3. Pass a tools and equipment assessment with an 80% score or higher.	1.0 Communications: 2.1, 2.3 Health & Safety: 6.4 Technical Knowledge & Skills: 10.1 Demonstration & Application: 11.1 **CTE Pathway:** C2.2, C2.3
F. 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 to an auto technician. (2 hours)	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. Describe and demonstrate the use of web-based search engines in finding automotive technical information. 5. Explain the advantages of using web-based search engines over service manuals in finding automotive technical information. 6. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. 7. Pass a service manual and computer-based information system assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4, 10, 11 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Technology: 4.1, 4.2 Demonstration & Application: 11.1 **CTE Pathway:** C2.6, C4.3, C4.4
G. ELECTRICAL SYSTEMS Understand, apply, and evaluate the principles of automotive electricity.	1. Define the following terms: a. electricity b. current c. alternating current (AC) d. direct current (DC) e. conductor f. resistance g. inductance	**Career Ready Practice:** 1, 2, 5, 10 **CTE Anchor:** Academics: 1.0

(18 hours)	h. voltage i. Ohm's Law j. magnetism 2. Identify and describe the features and functions of the following: a. devices used in measuring electricity b. electrical circuits and their components c. electrical systems found in cars d. automotive storage battery e. fuses f. electrical accessories 3. Solve Ohm's Law problems pertaining to series circuits. 4. Identify and describe the features and functions of the following charging systems and components: a. battery b. alternator c. voltage regulator d. charging system gauge or warning light e. power (train) control module f. memory saver 5. Describe how an alternator AC current is changed to DC current. 6. Describe and demonstrate the following: a. testing automotive storage load-test batteries b. testing charging system output c. adjusting an alternator belt d. diagnosing charging system malfunctions e. repairing charging system malfunctions 7. Identify and describe the features and function of the following starting systems and components: a. battery b. ignition switch c. neutral safety switch d. starter relay e. starter solenoid f. battery cables g. starter motor h. immobilizer 8. Describe and demonstrate the following: a. understanding a simple starting system circuit b. diagnosing common starting system problems c. removing and replacing a starter motor 9. Pass an electrical systems assessment with an 80% score or higher.	Communications: 2.1, 2.3 Problem Solving & Critical Thinking: 5.2, 5.4 Technical Knowledge & Skills: 10.1 Demonstration & Application: 11.1 **CTE Pathway:** C2.1, C2.4, C3.5, C6. C7.1, C7.2, C7.3, C7.7

H. BRAKE SYSTEMS Understand, apply, and evaluate the principles of automotive brake systems.	1. Define Pascal's Law. 2. Check the master cylinder for internal/external leaks and proper operation; determine necessary action. 3. Remove, bench bleed, and reinstall the master cylinder. 4. Form teams to diagnose poor stopping, pulling, or dragging concerns caused by malfunctions in the hydraulic system; determine necessary action. 5. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action. 6. Replace brake lines, hoses, fittings, and supports. 7. Select, handle, store, and fill brake fluids to the proper level. 8. Inspect, test, and/or replace components of brake warning light system. 9. Explain and discuss the different types of brake fluids: a. DOT- 3 b. DOT- 4 c. DOT- 5 10. Explain the process to check and test brake fluid for contamination. 11. Discuss the different types of bleeding sequences and demonstrate how to bleed and/or flush brake system with: a. vacuum bleeding b. two-person bleeding c. gravity bleeding d. pressure bleeding 12. Form teams to diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action. 13. Demonstrate how to remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble. 14. Inspect and install wheel cylinders. 15. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings. 16. Install wheel, torque lug nuts, and make final checks and adjustments.	**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, 5.4 Leadership & Teamwork: 9.3, 9.7 Technical Knowledge & Skills: 10.1 Demonstration & Application: 11.1 **CTE Pathway:** C2.2, C2.5, C8.1, C8.

(18 hours)	17. Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action. 18. Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action. 19. Remove, inspect, and replace pads and retaining hardware; determine necessary action. 20. Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action. 21. Remove and reinstall the rotor. 22. Describe the different types of power assists units: a. vacuum booster b. hydraulic hydro booster c. electrical booster 23. Pass a brake systems assessment with an 80% score or higher.	
I. SUSPENSION & STEERING SYSTEMS Understand, apply, and evaluate the principles of automotive suspension and steering systems.	1. Diagnose short and long arm suspension system noises, body sway, and uneven ride height concerns; determine necessary action. 2. Demonstrate, remove, inspect, install, and adjust where applicable: a. upper and lower control arms, bushings, shafts, and rebound bumpers b. upper and/or lower ball joints c. steering knuckle assemblies d. short and long arm suspension system coil springs and spring insulators e. strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount f. leaf springs, leaf spring insulators (silencers), shackles, brackets, bushings, and mounts 3. Form teams to diagnose steering column noises, looseness, and binding concerns (including tilt mechanisms); determine necessary action. 4. Determine proper power steering fluid type; inspect fluid level and condition. 5. Demonstrate how to flush, fill, and bleed the power steering system. 6. Remove, inspect, replace, and adjust power steering pump belt. 7. Demonstrate how to diagnose vehicle wander, drift, pull, hard steering, bump steer, memory steer, torque	**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, 5.3, 5.4 Leadership & Teamwork: 9.3, 9.7 Demonstration & Application: 11.1 **CTE Pathway:** C3.3, C8.4, C8.5

(18 hours)	steer, and steering return concerns; determine necessary action. 8. Form teams to perform pre-alignment inspection and measure vehicle ride height; perform necessary action. 9. Demonstrate how to inspect tire condition; identify tire wear patterns; check and adjust air pressure; determine necessary action. 10. Form teams to diagnose wheel/tire vibration, shimmy, and noise; determine necessary action. 11. Rotate tires according to manufacturer's recommendations. 12. Pass a suspension and steering system assessment with an 80% score or higher.	
J. ENGINE REPAIR SYSTEMS Understand, apply, and evaluate the principles of internal combustion engine design, cooling system, and lubrication system.	1. Identify and describe the features and functions of the following: a. major parts of an automobile engine b. different types of cylinder configurations c. valve arrangements i. overhead valve ii. overhead cam iii. double overhead cam iv. multiple valve heads 2. Define the four-stroke cycle. 3. Identify and describe the features and functions of the following cooling systems: a. air cooling system b. liquid cooling system 4. Identify and describe the features and functions of the following liquid cooling system components: a. radiator b. radiator cooling fans c. pressure cap d. reserve tank e. water pump f. thermostat g. bypass system h. freeze plugs i. head gaskets j. intake manifold gaskets k. heater core l. hoses 5. Describe the function of antifreeze/coolant.	**Career Ready Practice:** 1, 2, 4, 5, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3, 2.5 Technology: 4.2 Problem Solving & Critical Thinking: 5.1, 5.2 Technical Knowledge & Skills: 10.1 Demonstration & Application: 11.1 **CTE Pathway:** C2.2, C2.3, C3.1, C3.2 C3.7, C6.1, C6.2, C6.3 C6.4, C7.5

(18 hours)	6. Identify and describe the features and functions of the following lubrication system components: a. oil pan/oil sump b. oil pump c. pressure relief valve d. oil filter e. oil galleries f. positive crankcase ventilation (PCV) g. oil pressure indicator h. oil level sensor i. engine oil cooler 7. Describe the following: a. characteristics of various motor oil types and viscosities b. types of oil pumps c. importance of oil filters d. lubrication of the lower end of the engine e. lubrication of the top end of the engine 8. Describe and demonstrate the following: a. diagnose common lubrication system problems b. perform oil pressure tests; determine necessary action c. repair various lubrication system malfunctions d. perform engine lubrication system service 9. Pass an engine repair systems assessment with an 80% score or higher.	
K. EMPLOYABILITY SKILLS AND RESUME PREPARATION Understand, apply, and evaluate the employability skills and resume preparation desired of automotive technicians.	1. Understand and define employer requirements for soft skills such as: 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	**Career Ready Practice:** 1, 2, 3, 4, 5, 7, 8, 9, 10, **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

(3 hours)	o. work ethic 2. Develop a career plan that reflects career interests, pathways, and post-secondary options. 3. Create/revise a resume, 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. 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: 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	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: 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

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