Course Outline

Transportation **REVISED: August/2023**

Job Title
Auto Technician

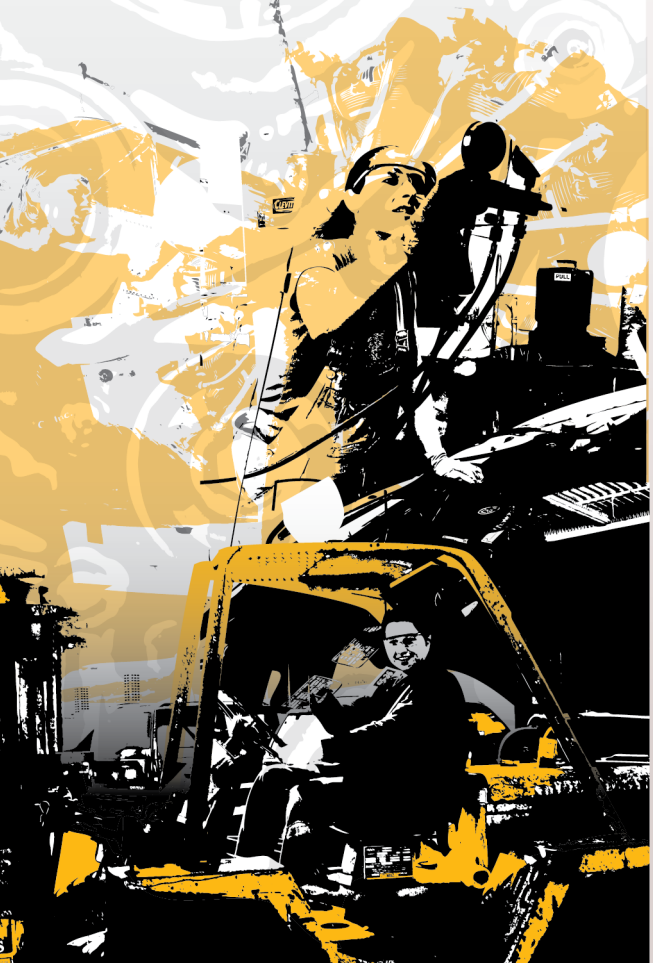
Career Pathway:
Systems Diagnostics & Service Repair

Industry Sector:
Transportation

O*NET-SOC CODE:
49-3023.00

CBEDS Title:
Advanced Automotive

CBEDS No.:
5669



79-90-64

Auto Tech: Electrical and Electronics/2

Credits: 10 **Hours:** 150

Course Description:
This competency-based course is the second in a sequence of two courses. It provides students with technical instruction and practical experience in an automobile area incorporating sustainable and green vehicle technologies. Instruction includes orientation review, safety general review, resource management review, trade mathematics review, tools and equipment review, service manuals and computer-based information systems review, electrical theory, lighting systems diagnosis and repair, gauges, warning devices, and driver information systems diagnosis and repair, horn, wiper/washer diagnosis and repair, accessories diagnosis and repair, digital storage oscilloscopes and controller area network, employability skills and resume preparation review, and entrepreneurial skills. 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 successful completion of Auto Tech: Electrical and Electronics/1 (79-90-61) 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.

Los Angeles Unified School District
Division of Adult and Career Education
Instructional and Couseling Services Unit
Adult Curriculum Office
www.wearedace.org

COURSE OUTLINE COMPETENCY-BASED COMPONENTS

A course outline reflects the essential intent and content of the course described. Acceptable course outlines have six components. (Education Code Section 52506). Course outlines for all apportionment classes, including those in jails, state hospitals, and convalescent hospitals, contain the six required elements:

(EC 52504; 5CCR 10508 [b]; Adult Education Handbook for California [1977], Section 100)

COURSE OUTLINE COMPONENTS	**LOCATION**
GOALS AND PURPOSES	Cover

The educational goals or purposes of every course are clearly stated, and the class periods are devoted to instruction. The course should be broad enough in scope and should have sufficient educational worth to justify the expenditure of public funds.

The goals and purpose of a course are stated in the COURSE DESCRIPTION. Course descriptions state the major emphasis and content of a course and are written to be understandable by a prospective student.

PERFORMANCE OBJECTIVES OR COMPETENCIES	pp. 7-14

Objectives should be delineated and described in terms of measurable results for the student and include the possible ways in which the objectives contribute to the student's acquisition of skills and competencies.

Performance Objectives are sequentially listed in the COMPETENCY-BASED COMPONENTS section of the course outline. Competency Areas are units of instruction based on related competencies. Competency Statements are competency area goals that together define the framework and purpose of a course. Competencies fall on a continuum between goals and performance objectives and denote the outcome of instruction.

Competency-based instruction tells a student before instruction what skills or knowledge they will demonstrate after instruction. Competency-based education provides instruction which enables each student to attain individual goals as measured against pre-stated standards.

Competency-based instruction provides immediate and continual repetition and In competency-based education the curriculum, instruction, and assessment share common characteristics based on clearly stated competencies. Curriculum, instruction, and assessment in competency-based education are explicit, known, agreed upon, integrated, performance oriented, and adaptive.

COURSE OUTLINE COMPETENCY-BASED COMPONENTS (continued)

COURSE OUTLINE COMPONENTS	LOCATION
INSTRUCTIONAL STRATEGIES	p. 16
Instructional techniques or methods could include laboratory techniques, lecture methods, small-group discussion, grouping plans, and other strategies used in the classroom. Instructional strategies for this course are listed in the TEACHING STRATEGIES AND EVALUATION section of the course outline. Instructional strategies and activities for a course should be selected so that the overall teaching approach considers the instructional standards of a particular program, i.e., English as a Second Language, Programs for Adults with Disabilities.	
UNITS OF STUDY, WITH APPROXIMATE HOURS ALLOTTED FOR EACH UNIT	Cover
The approximate time devoted to each instructional unit on the course, as well as the total hours for the course, is indicated. The time in class is consistent with the needs of the student, and the length of the class should be so that it ensures the student will learn at an optimum level. Units of study, with approximate hours allotted for each unit are listed in the COMPETENCY AREA STATEMENT(S) of the course outline. The total hours of the course, including work-based learning hours (community classroom and cooperative vocational education) are listed on the cover of every CBE course outline. Each Competency Area listed within a CBE outline is assigned hours of instruction per unit.	pp. 7-14
EVALUATION PROCEDURES	p. 16
The evaluation describes measurable evaluation criteria clearly within the reach of the student. The evaluation indicates anticipated improvement in performance as well as anticipated skills and competencies to be achieved. Evaluation procedures are detailed in the TEACHING STRATEGIES AND EVALUATION section of the course outline. Instructors monitor students' progress on a continuing basis, assessing students on attainment of objectives identified in the course outline through a variety of formal and informal tests (applied performance procedures, observations, and simulations), paper and pencil exams, and standardized tests.	
REPETITION POLICY THAT PREVENTS PERPETUATION OF STUDENT ENROLLMENT	Cover
After a student has completed all the objectives of the course, he or she should not be allowed to reenroll in the course. There is, therefore, a need for a statement about the conditions for possible repetition of a course to prevent perpetuation of students in a particular program for an indefinite period of time.	

ACKNOWLEDGMENTS

Thanks to LUIS GARCIA, VICTOR LERMA, ALDO ROBLES, SEYED SAIDI, and JUAN SOLTERO for developing and editing this curriculum. Acknowledgment is also given to ERICA ROSARIO for designing the original artwork for the course covers.

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CALIFORNIA CAREER TECHNICAL EDUCATION MODEL CURRICULUM STANDARDS
Transportation Industry Sector
Knowledge and Performance Anchor Standards

1.0 Academics
Analyze and apply appropriate academic standards required for successful industry sector pathway completion leading to postsecondary education and employment. Refer to the Transportation academic alignment matrix for identification of standards.

2.0 Communications
Acquire and accurately use Transportation sector terminology and protocols at the career and college readiness level for communicating effectively in oral, written, and multimedia formats.

3.0 Career Planning and Management
Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans.

4.0 Technology
Use existing and emerging technology to investigate, research, and produce products and services, including new information, as required in the Transportation sector workplace environment.

5.0 Problem Solving and Critical Thinking
Conduct short, as well as more sustained, research to create alternative solutions to answer a question or solve a problem unique to the Transportation sector using critical and creative thinking, logical reasoning, analysis, inquiry, and problem-solving techniques.

6.0 Health and Safety
Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the Transportation sector workplace environment.

7.0 Responsibility and Flexibility
Initiate, and participate in, a range of collaborations demonstrating behaviors that reflect personal and professional responsibility, flexibility, and respect in the Transportation sector workplace environment and community settings.

8.0 Ethics and Legal Responsibilities
Practice professional, ethical, and legal behavior, responding thoughtfully to diverse perspectives and resolving contradictions, when possible, consistent with applicable laws, regulations, and organizational norms.

9.0 Leadership and Teamwork
Work with peers to promote divergent and creative perspectives, effective leadership, group dynamics, team and individual decision making, benefits of workforce diversity, and conflict resolution as practiced in the SkillsUSA career technical student organization

10.0 Technical Knowledge and Skills
Apply essential technical knowledge and skills common to all pathways in the Transportation sector, following procedures when carrying out experiments or performing technical tasks.

11.0 Demonstration and Application
Demonstrate and apply the knowledge and skills contained in the Transportation anchor standards, pathway standards, and performance indicators in classroom, laboratory, and workplace settings, and through the SkillsUSA career technical student organization.

C. Systems Diagnostics and Service Repair Pathway

The Systems Diagnostics and Service pathway prepares students for postsecondary education and employment in the transportation industry, which includes but is not limited to motor vehicles, rail systems, marine applications, and small-engine and specialty equipment.

Sample occupations associated with this pathway:

- Service Technician/Maintenance Worker/Shop Foreman
- Technical Writer
- Dispatcher
- Engineer
- Investigator/Inspector

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.

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

C3.0 Use scientific principles in relation to chemical, mechanical, and physical functions for various engine and vehicle systems.

C4.0 Perform and document maintenance procedures in accordance with the recommendations of the manufacturer.

C5.0 Apply and understand appropriate business practices.

C6.0 Demonstrate the application, operation, maintenance, and diagnosis of engines, including but not limited to two- and four-stroke and supporting subsystems.

C7.0 Demonstrate the function, principles, and operation of electrical and electronic systems using manufacturer and industry standards.

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.

COMPETENCY-BASED COMPONENTS
for the Auto Tech: Electrical and Electronics/2 Course

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
A. ORIENTATION REVIEW Understand, apply, and evaluate classroom and workplace policies and procedures. (2 hours)	1. Review the scope and purpose of the course. 2. Review the classroom policies and procedures. 3. Review and demonstrate Zoom, Schoology, and basic computer skills. 4. Review students' basic knowledge in electrical and electronic principles. 5. Review, 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. 6. Review the 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, respecting 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 importance of becoming a licensed Brake and Lamp Inspector. 10. Review the importance of Advanced Driver Assistance Systems (ADAS) certification. 11. Review 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 and Management: 3.1, 3.4, 3.5, 3.6, 3.9 Technology: 4.1, 4.5 Problem Solving & Critical Thinking: 5.4 Ethics and Legal Responsibilities: 8.2, 8.3, 8.4, 8.5 Leadership & Teamwork: 9.3, 9.4, 9.6 Demonstration and Application: 11.1, 11.2 **CTE Pathway:** C2.6
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, and accidents or injury prevention. 2. Review the California Occupational Safety and Health Administration (Cal/OSHA) workplace requirements for auto technicians to maintain a safe and healthy working environment. 3. Review the impact of Environmental Protection Agency (EPA) legislation on 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	**Career Ready Practice:** 1, 2, 10, 12 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(3 hours)	in an auto shop. 5. Review the impact of California Air Resources Board (ARB) legislation on Transportation Industry Sector. 6. Review the Bureau of Automotive Repair (BAR) standards for consumer and environmental protection. 7. Review the use of the Safety Data Sheet (SDS) as it applies to the automotive industry. 8. Review the safety items required by the federal, state, and local regulations. 9. Review 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 10. Pass the safety test with 100% accuracy.	Health and Safety: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 Technical Knowledge and Skills: 10.2, 10.4 Demonstration and Application: 11.1 **CTE Pathway:** C1.2, C1.4, C2.2
C. RESOURCE MANAGEMENT REVIEW Review, apply and evaluate the resource management principles and techniques in the auto repair and maintenance business. (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 and Flexibility: 7.1, 7.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** C5.2
D. TRADE MATHEMATICS REVIEW Review, apply and evaluate the mathematical requirements used in auto repair and maintenance.	1. Review the practical math terminology in auto repair and maintenance. 2. Review and demonstrate 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	**Career Ready Practice:** 1, 2, 5, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(1 Hour)	units of the measuring system and draw conclusions to make informed decisions. 4. Review and demonstrate problem-solving techniques for: a. algebraic problems b. percentages c. reading and interpreting graphs d. calculator 5. Pass a trade mathematics assessment with an 80% score or higher.	Problem Solving and Critical Thinking: 5,1, 5.2 Technical Knowledge and Skills: 10.1 Demonstration and Application: 11.1 **CTE Pathway:** C2.4
E. TOOLS AND EQUIPMENT REVIEW Review, apply and evaluate the policies and procedures for using electrical and electronic repair and maintenance tools and equipment in accordance with federal, state, and local safety and environment regulations. (5 Hours)	1. Review and demonstrate the proper use, maintenance, and storage techniques for: a. automotive hand tools b. power tools and equipment c. door panel trim tool(s) d. headlight aimer or screen e. heat gun (or equivalent for heat shrinking operations) f. wire and terminal repair kit g. multimeter h. soldering tools i. digital Storage Oscilloscope (DSO) j. scanners k. battery charging and starter testers l. memory saver m. chemicals 2. Review and demonstrate the following: a. selection of the appropriate hand, power tools, and equipment for each job 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 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.	**Career Ready Practice:** 1, 2, 10 **CTE Anchor:** Academics: 1.0 Communication: 2.1, 2.3 Health and Safety: 6.4 Technical Knowledge and Skills: 10.1 Demonstration and Application: 11.1 **CTE Pathway:** C2.2, C2.3
F. SERVICE MANUALS AND COMPUTER-BASED INFORMATION SYSTEMS REVIEW Review, apply and evaluate the contents of service manuals and computer-based	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. Review and demonstrate the use of web-based search engines in finding automotive technical information. 5. Review work order to include customer information, vehicle	**Career Ready Practice:** 1, 2, 4, 10, 11 **CTE Anchor:** Academics: 1.0

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
information systems as important sources of reference to an auto technician. (2 Hours)	identifying information, customer concern, related service history, cause, and correction. 6. Pass a service manual and computer-based information system assessment with an 80% score or higher.	Communications: 2.1, 2.3 Technology: 4.1, 4.2 Demonstration and Application: 11.1 **CTE Pathway:** C2.6, C4.3, C4.4
G. ELECTRICAL THEORY Understand, apply, and evaluate the electrical theories that are applicable to auto repair and maintenance. (15 Hours)	1. Describe the electron flow theory. 2. Describe the nature of electrical resistance. 3. Describe the magnetic induction theory. 4. Describe the voltage drop across resistors and inductors. 5. Describe the operation of variable resistors such as thermistors and potentiometers. 6. Describe the operation of voltage generators such as oxygen and knock sensors. 7. Describe the operation of magnetic inductor sensors such as distributor and crankshaft sensors. 8. Describe the transistor function. 9. Describe semi-conductor function. 10. Describe the computer input/output logic. 11. Describe sensor ranges and system compensation. 12. Describe the electronic fuel control loop. 13. Describe oxygen feedback (open/closed loop) carburetion. 14. Describe electronic fuel injection theory. 15. Describe the function of the electronic ignition module. 16. Describe system self-diagnostics. 17. Pass an electrical theory assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Technical Knowledge and Skills: 10.1 **CTE Pathway:** C5.1
H. LIGHTING SYSTEMS DIAGNOSIS AND REPAIR Understand, apply, and evaluate the diagnostic and repair techniques for auto lighting systems.	1. Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction. 2. Diagnose the cause of brighter than normal, intermittent, dim or no light operation; determine necessary action. 3. Inspect, replace, and aim headlights and bulbs. 4. Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action. 5. Identify system voltage and safety precautions associated with high intensity discharge headlights. 6. Pass a lighting systems diagnosis and repair assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4, 5 **CTE Anchor:** Academics: 1.0 Communication: 2.1, 2.3 Technology: 4.1, 4.3 Problem Solving and Critical Thinking: 5.2, 5.3, 5.4

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(20 Hours)		Technical Knowledge and Skills: 10.1, 10.3 **CTE Pathway:** C3.7, C4.4, C7.1, C7.4, C7.7
I. GAUGES, WARNING DEVICES AND DRIVER INFORMATION SYSTEMS DIAGNOSIS AND REPAIR Understand, apply, and evaluate the diagnostic and repair techniques for gauges, warning devices and driver information systems. (20 Hours)	1. Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action. 2. Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action. 3. Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action. 4. Inspect and test sensors, connectors, and wires of electronic (digital) instrument circuits; determine necessary action. 5. Pass a gauge, warning devices and driver information systems diagnosis and repair assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 5 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Problem Solving and Critical Thinking: 5.2, 5.3, 5.4 Technical Knowledge and Skills: 10.3 **CTE Pathway:** C2.1, C2.2, C2.3, C2.7, C3.7, C7.1, C7.7
J. HORN, WIPER/WASHER DIAGNOSIS, AND REPAIR Understand, apply, and evaluate the diagnostic and repair techniques for the horn and wiper/washer.	1. Diagnose incorrect horn operation; perform necessary action. 2. Diagnose incorrect wiper operation; diagnose wiper speed control and park/shifting problems; perform necessary action. 3. Form teams and diagnose incorrect washer operation; perform necessary action. 4. Pass a horn and wiper/washer diagnosis and repair assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 5, 9 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Leadership and Teamwork: 9.3, 9.7

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(20 Hours)		Technical Knowledge and Skills: 10.3 **CTE Pathway:** C2.2, C2.3, C2.7, C3.7, C7.6, C7.7
K. ACCESSORIES DIAGNOSIS AND REPAIR Understand, apply, and evaluate the diagnostic and repair techniques for auto accessories. (30 Hours)	1. Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action. 2. Diagnose incorrect heated glass, mirror, or seat operation; determine necessary action. 3. Diagnose incorrect electric lock operation (including remote keyless entry); determine necessary action. 4. Diagnose incorrect operation of cruise control system; determine necessary action. 5. Diagnose supplemental restraint system (SRS) concerns; determine necessary action. 6. Disarm and enable the airbag system for vehicle service. 7. Diagnose radio static and weak, intermittent or no radio reception; determine necessary action. 8. Remove and reinstall door panel. 9. Diagnose body electronic system circuits using a scan tool; determine necessary action. 10. Diagnose the cause of false, intermittent or no operation of anti-theft systems. 11. Form teams and describe the operation of keyless entry/remote-start systems. 12. Perform software transfers, software updates or flash reprogramming on electronic modules. 13. Pass an accessories diagnosis and repair assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4, 5, 9, 11 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Technology: 4.1, 4.3, 4.5 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Leadership and Teamwork: 9.2, 9.7 Technical Knowledge and Skills: 10.3 **CTE Pathway:** C2.1, C2.2, C2.3, C2.6, C2.7, C3.7, C7.1, C7.7
L. DIGITAL STORAGE OSCILLOSCOPES (DSO) AND CONTROLLER AREA NETWORK (CAN) Understand, apply, and evaluate the DSO and CAN.	1. Describe and demonstrate the use of the digital storage oscilloscope (DSO): a. time per division b. volts per division 2. Explain and interpret DSO readings and determine if the values are within factory specifications. 3. Describe the types of networks and serial communications used on vehicles. 4. Discuss how the networks connect to data link connector (DLC) and to other modules. 5. Explain how to diagnose communication faults. 6. Explain how to use scan tools to retrieve trouble codes 7. Pass a DSO and CAN assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Technology: 4.1

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(25 hours)		Technical Knowledge and Skills: 10.1 Demonstration and Application: 11.1 **CTE Pathway:** C2.3, C7.1, C7.7
M. EMPLOYABILITY SKILLS AND RESUME PREPARATION REVIEW Understand, apply, and evaluate the employability skills and resume preparation desired of administrative assistants. (2 hours)	1. Review 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 o. work ethic 2. Review a career plan that reflects career interests, pathways, and post-secondary options. 3. Revise a resume, cover letter and/or portfolio. 4. Review, analyze, research, and review the role of online job searching platforms and career websites to make informed decisions. 5. Review the importance of assessing social media account content for professionalism. 6. Review 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 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	**Career Ready Practice:** 1, 2, 3, 4, 5, 7, 8, 9, 10, 11 **CTE Anchor:** Academics: 1.0 Communication: 2.1, 2.3, 2.4. 2.5 Career Planning and 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 and Critical Thinking: 5.1, 5.4 Responsibility and Flexibility: 7.2, 7.3, 7.4, 7.7 Ethics and Legal Responsibilities: 8.3, 8.4, 8.5 Leadership and Teamwork: 9.1, 9.2, 9.3, 9.4, 9.6, 9.7 Technical Knowledge and Skills: 10.1, 10.3, Demonstrate and Application: 11.1, 11.2, 11.5 **CTE Pathway:** C5.4, C5.5

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
N. ENTREPENURIAL SKILLS Understand, apply, and evaluate the process involved in becoming an entrepreneur in the auto repair and maintenance industry. (4 Hours)	1. Define entrepreneurship. 2. Identify and research the necessary characteristics of successful entrepreneurs. 3. Examine personal goals prior to starting a business. 4. Evaluate sources of monetary investment in a business opportunity. 5. Explain licensing/permit requirements for a business. 6. Explain how the Small Business Administration (SBA) assists entrepreneurs with lenders and funding to help them plan, start and grow a business. 7. Demonstrate a budget to identify start-up expenses. 8. Pass an entrepreneurial skills 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, 2.5 Technology: 4.1, 4.2, 4.5 Responsibility and Flexibility: 7.1, 7.6 Technical Knowledge and Skills: 10.1, 10.3, 10.4 Demonstration and Application: 11.1, 11.2, 11.3, 11.4, **CTE Pathway:** C5.1, C5.2, C5.3, C5.5

SUGGESTED INSTRUCTIONAL MATERIALS and OTHER RESOURCES

TEXTBOOKS

Duffy, James E. Auto Electricity and Electronics, 7th Edition. Goodheart-Wilcox Publisher, 2020.

Duffy, James E. Modern Automotive Technology, 10th Edition. Goodheart-Willcox Publishing, 2022.

Halderman, James D and Chase D. Mitchell. Diagnosis and Troubleshooting of Automotive Electric, Electronic, and Computer Systems, 6th Edition. Prentice Hall, 2011.

RESOURCES

Employer Advisory Board members

CTE Model Curriculum Standards
http://www.cde.ca.gov/ci/ct/sf/documents/transportation.pdf

Automotive Service Education Foundation (ASEF)
https://www.aseeducationfoundation.org/

National Automobile Dealers Association (NADA) Public Relations Dept., 8400 Westpark Dr., McLean, VA 22102-3591. Phone: (703) 821-7000.

National Institute for Automotive Service Excellence (ASE) 101 Blue Seal Dr. SE, Suite 101, Leesburg, VA 20175. Phone: (703) 669-6600.

SkillsUSA P.O. Box 3000, Leesburg, VA 20177-0300. Phone: (703) 777-8810. Fax: (703) 777-8999.
www. skillsusa.org

COMPETENCY CHECKLIST

TEACHING STRATEGIES and EVALUATION

METHODS AND PROCEDURES

A. Lecture and discussion

B. Demonstration

C. Multimedia presentations

EVALUATION

SECTION A – Orientation Review – Pass the safety test with 100% accuracy.

SECTION B – Safety General Review – Pass the safety test with 100% accuracy.

SECTION C – Resource Management Review – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION D – Trade Mathematics Review – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION E – Tools and Equipment Review – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION F – Service Manuals and Computer-Based Information Systems Review – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION G – Electrical Theory – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION H – Lighting Systems Diagnosis and Repair – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION I – Gauges, Warning Devices, and Driver Information Systems Diagnosis and Repair – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION J – Horn, Wiper/Washer Diagnosis and Repair – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION K – Accessories Diagnosis and Repair – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION L – Digital Storage Oscilloscopes (DSO) and Controller Area Network (CAN) – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION M – Employability Skills & Resume Preparation Review – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION N – Entrepreneurial Skills – Pass all assignments and exams with a minimum score of 80% or higher.

DEFINITIONS OF TECHNICAL TERMS

ADJUST - to bring components to specified operational settings.

ALIGN - to restore the proper position of components.

ANALYZE - to assess the condition of a component or system.

ASSEMBLE (REASSEMBLE) - to fit together the components of a device or system.

BALANCE - to establish correct linear, rotational or weight relationship.

BLEED - to remove air from a closed system.

CAN – Controller Area Network. CAN is a network protocol (SAE J2284/ISO 15765-4) used to interconnect a network of electronic control modules

CHARGE - to bring to a specified state, e.g., battery or air conditioning system.

CHECK - to verify condition by performing an operational or comparative examination.

CLEAN - to rid components of foreign matter for the purpose of reconditioning, repairing, measuring, or reassembling.

DEGLAZE – to remove a smooth glossy surface.

DETERMINE - to establish the procedure to be used to perform the necessary repair.

DETERMINE NECESSARY ACTION – indicates that the diagnostic routine(s) is the primary emphasis of a task. The student is required to perform the diagnostic steps and communicate the diagnostic outcomes and corrective actions required addressing the concern or problem. The training program determines the communication method (worksheet, test, verbal communication, or other means deemed appropriate) and whether the corrective procedures for these tasks are actually performed.

DIAGNOSE - to identify the cause of a problem.

DISASSEMBLE - to separate a component's parts as preparation for cleaning, inspection, or service.

DISCHARGE - to empty a storage device or system.

EVACUATE - to remove air, fluid, or vapor from a closed system by use of a vacuum pump.

FLUSH - to internally clean a component or system.

HIGH VOLTAGE – voltages of 50 volts and higher.

HONE - to restore or resize a bore by using rotating cutting stones.

JUMP START - to use an auxiliary power supply to assist a battery to crank an engine.

LOCATE – to determine or establish a specific spot or area.

MEASURE - to determine existing dimensions/values for comparison to specifications.

NETWORK - a system of interconnected electrical modules or devices.

ON-BOARD DIAGNOSTICS (OBD) - diagnostic protocol which monitors computer inputs and outputs for failures.

PARASITIC DRAW - electrical loads which are still present when the ignition circuit is OFF.

PERFORM - to accomplish a procedure in accordance with established methods and standards.

PERFORM NECESSARY ACTION – indicates that the student is to perform the diagnostic routine(s) and perform the corrective action item. Where various scenarios (conditions or situations) are presented in a single task, at least one of the scenarios must be accomplished.

PURGE - to remove air or fluid from a closed system.

REMOVE - to disconnect and separate a component from a system.

REPAIR - to restore a malfunctioning component or system to operating condition.

REPLACE - to exchange a component; to reinstall a component.

RESURFACE – to restore correct finish.

SERVICE - to perform a procedure as specified in the owner's or service manual.

TEST - to verify condition through the use of meters, gauges, or instruments.

TORQUE - to tighten a fastener to specified degree or tightness (in a given order or pattern if multiple fasteners are involved on a single component).

VERIFY - to confirm that a problem exists after hearing the customer's concern; or, to confirm the effectiveness of a repair.

VOLTAGE DROP - a reduction in voltage (electrical pressure) caused by the resistance in a component or circuit.

Standards for Career Ready Practice

1. **Apply appropriate technical skills and academic knowledge.**
   Career-ready individuals readily access and use the knowledge and skills acquired through experience and education. They make connections between abstract concepts with real-world applications and recognize the value of academic preparation for solving problems, communicating with others, calculating measures, and performing other work-related practices.

2. **Communicate clearly, effectively, and with reason.**
   Career-ready individuals communicate thoughts, ideas, and action plans with clarity, using written, verbal, electronic, and/or visual methods. They are skilled at interacting with others: they are active listeners who speak clearly and with purpose, and they are comfortable with terminology that is common to workplace environments. Career-ready individuals consider the audience for their communication and prepare accordingly to ensure the desired outcome.

3. **Develop an education and career plan aligned with personal goals.**
   Career-ready individuals take personal ownership of their educational and career goals and manage their individual plan to attain these goals. They recognize the value of each step in the educational and experiential process, and they understand that nearly all career paths require ongoing education and experience to adapt to practices, procedures, and expectations of an ever-changing work environment. They seek counselors, mentors, and other experts to assist in the planning and execution of education and career plans.

4. **Apply technology to enhance productivity.**
   Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring and using new technology. They understand the inherent risks—personal and organizational—of technology applications, and they take actions to prevent or mitigate these risks.

5. **Utilize critical thinking to make sense of problems and persevere in solving them.**
   Career-ready individuals recognize problems in the workplace, understand the nature of the problems, and devise effective plans to solve the problems. They thoughtfully investigate the root cause of a problem prior to introducing solutions. They carefully consider options to solve a problem and, once agreed upon, follow through to ensure the problem is resolved.

6. **Practice personal health and understand financial literacy.**
   Career-ready individuals understand the relationship between personal health and workplace performance. They contribute to their personal well-being through a healthy diet, regular exercise, and mental health activities. Career-ready individuals also understand that financial literacy leads to a secure future that enables career success.

7. **Act as a responsible citizen in the workplace and the community.**
   Career-ready individuals understand the obligations and responsibilities of being a member of a community and demonstrate this understanding every day through their interactions with others. They are aware of the impacts of their decisions on others and the environment around them, and they think about the short-term and long-term consequences of their actions. They are reliable and consistent in going beyond minimum expectations and in participating in activities that serve the greater good.

8. **Model integrity, ethical leadership, and effective management.**
Career-ready individuals consistently act in ways that align with personal and community-held ideals and principles. They employ ethical behaviors and actions that positively influence others. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the direction and actions of a team or organization, and they recognize the short-term and long-term effects that management's actions and attitudes can have on productivity, morale, and organizational culture.

9. **Work productively in teams while integrating cultural and global competence.**
Career-ready individuals contribute positively to every team, as both team leaders and team members. To avoid barriers to productive and positive interaction, they apply an awareness of cultural differences. They interact effectively and sensitively with all members of the team and find ways to increase the engagement and contribution of other members.

10. **Demonstrate creativity and innovation.**
Career-ready individuals recommend ideas that solve problems in new and different ways and contribute to the improvement of the organization. They consider unconventional ideas and suggestions by others as solutions to issues, tasks, or problems. They discern which ideas and suggestions may have the greatest value. They seek new methods, practices, and ideas from a variety of sources and apply those ideas to their own workplace practices.

11. **Employ valid and reliable research strategies.**
Career-ready individuals employ research practices to plan and carry out investigations, create solutions, and keep abreast of the most current findings related to workplace environments and practices. They use a reliable research process to search for new information and confirm the validity of sources when considering the use and adoption of external information or practices.

12. **Understand the environmental, societal, and economic impacts of decisions.**
Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact other people, organizations, the workplace, and the environment. They are aware of and utilize new technologies, understandings, procedures, and materials and adhere to regulations affecting the nature of their work. They are cognizant of impacts on the social condition, environment, workplace, and profitability of the organization.

Statement for Civil Rights

All educational and vocational opportunities are offered without regard to race, color, national origin, gender, or physical disability.