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

79-90-62

Auto Tech: Electrical and Electronics/1

Credits: 10 **Hours:** 150

Course Description:
This competency-based course is one 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, safety general, resource management, trade mathemathics, tools and equipment, service manuals and computer-based information systems, basic automotive electricity, electrical and electronic components, general electrical system diagnosis, battery diagnosis and service, starting system diagnosis and repair, charging system diagnosis and repair, lighting and instrumentation, horn, wiper and accessory systems, and 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 successful completion of Technology/1: Automotive Systems (79-90-83), Technology/2: Automotive Systems (79-90-85), and Auto Tech: Engine Performance 1 (79-90-69) or Engine Repair (79-90-73). Basic knowledge in math and reading.

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.

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. 7-15

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. 17
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. 7-15
EVALUATION PROCEDURES	p. 17
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

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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.

CBE
Competency-Based Education

COMPETENCY-BASED COMPONENTS
for the Auto Tech: Electrical and Electronics/1 Course

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
A. ORIENTATION 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. Assess students' basic knowledge in electrical and electronic principles. 5. 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. 6. Discuss the 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, respecting 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 importance of becoming a licensed Brake and Lamp Inspector. 10. Describe the importance of Advanced Driver Assistance Systems (ADAS) certification. 11. 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 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 Understand safety procedures and techniques in the auto repair and maintenance sector.	1. Discuss classroom and workplace first aid, emergency procedures, and accidents or injury prevention. 2. Discuss the California Occupational Safety and Health Administration (Cal/OSHA) workplace 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	**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)	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 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. 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 10. Practice personal safety when lifting, bending, or moving equipment and supplies. 11. 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 Understand, apply, and evaluate the resource management principles and techniques in the auto repair and maintenance business. (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 and Flexibility: 7.1, 7.4 Technical Knowledge and Skills: 10.1 **CTE Pathway:** C5.2
D. TRADE MATHEMATICS Understand, apply, and evaluate the mathematical requirements used in auto	1. Define and identify the practical of math terminology in auto repair and maintenance. 2. Describe, demonstrate, and ask questions regarding problem-solving techniques involving: a. basic trade mathematical operations.	**Career Ready Practice:** 1, 2, 5, 10

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
repair and maintenance. (2 Hours)	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 and draw conclusions to make informed decisions. 4. Describe 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.	**CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 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 Understand, 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. Define, discuss, 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. Explain 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

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
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. Complete work order to include customer information, vehicle 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.	**Career Ready Practice:** 1, 2, 4, 10, 11 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Technology: 4.1, 4.2 Demonstration and Application: 11.1 **CTE Pathway:** C2.6, C4.3, C4.4
G. BASIC AUTOMOTIVE ELECTRICITY Understand, apply, and evaluate the electrical principles and theories that are applicable to auto repair and maintenance. (10 Hours)	1. Define the following: a. electricity b. current c. conductor d. resistance e. inductance f. voltage 2. Identify the devices used in measuring electrical activity. 3. Describe and explain Ohm's Law: a. Series circuit b. Parallel circuit c. Series/parallel circuit 4. Identify parts of a complete circuit: a. power source b. protection devices c. electrical loads d. switches/controls 5. Describe circuit fault types: a. Open circuit b. Short to voltage c. Short to ground d. High resistance 6. Compare alternating current (AC) to direct current (DC). 7. Describe how electricity can be generated. 8. Describe the function of fuses. 9. List the different types of electrical accessories. 10. Describe the function of the different types of electrical accessories. 11. Pass a basic automotive electricity 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 and Critical Thinking: 5.3 Technical Knowledge and Skills: 10.1 Demonstration and Application: 11.1 **CTE Pathway:** C2.2, C2.4, C7.1, C7.2, C7.3, C7.4, C7.7

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
H. ELECTRICAL AND ELECTRONIC COMPONENTS Understand, apply, and evaluate the electrical and electronic components of an automotive system. (5 hours)	1. Identify electrical components: a. resistors b. fuses c. switches d. capacitors e. coils f. conductors g. Relays h. Solenoids i. Electric motors j. Transformers 2. Identify electronic components: a. sensors b. semi-conductors c. transistors d. diodes e. Powertrain Control Model (PCM) 3. Describe automotive wiring: a. types solid and stranded b. wire gauge number system c. perform a wire repair 4. Describe and explain wiring diagrams: a. electrical symbols b. electronic symbols 5. Pass an electrical and electronic component 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:** C2.3
I. GENERAL ELECTRICAL SYSTEM DIAGNOSIS Understand, apply, and evaluate the diagnostic techniques for an auto electrical system.	1. Diagnose electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law). 2. Use wiring diagrams during diagnosis of electrical circuit problems. 3. Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems, including source voltage, voltage drop, current flow and resistance. 4. Check the electrical circuits with a test light; determine necessary action. 5. Check the electrical/electronic circuit waveforms; interpret readings and determine needed repairs. 6. Check the electrical circuits using fused jumper wires; determine necessary action. 7. Locate shorts, grounds, opens and resistance problems in electrical/electronic circuits; determine necessary action. 8. Measure and diagnose the cause(s) of excessive parasitic draw; determine necessary action. 9. Inspect and test fusible links, circuit breakers and fuses; determine necessary action. 10. Inspect and test switches, connectors, relays, solenoid solid	**Career Ready Practice:** 1, 2, 4, 5, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Technology: 4.1 Problem Solving and Critical Thinking: 5.2, 5.4 Demonstration and Application: 11.1 **CTE Pathway:** C2.2, C2.3, C2.6, C3.5, C3.7, C4.3,

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(45 Hours)	state devices and wires of electrical/electronic circuits; perform necessary action. 11. Remove and replace terminal end from connector; replace connectors and terminal ends. 12. Repair wiring harness (including CAN/BUS systems). 13. Perform solder repair of electrical wiring. 14. Pass a general electrical system diagnosis assessment with an 80% score or higher.	C7.1, C7.7
J. BATTERY DIAGNOSIS AND SERVICE Understand, apply, and evaluate the diagnostic and maintenance techniques for auto batteries. (15 Hours)	1. Perform battery state-of-charge test; determine necessary action. 2. Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action. 3. Maintain or restore electronic memory functions by using materials, when necessary. 4. Inspect, clean, fill and/or replace battery, battery cables, connectors, clamps, and hold-downs. 5. Describe the features and function of an automotive storage battery. 6. Form teams to test an automotive storage battery. 7. Perform battery charge. 8. Start a vehicle using jumper cables or an auxiliary power supply. 9. Identify high voltage circuits of electric or hybrid electric vehicle and related safety precautions. 10. Identify electronic modules, security systems, radio and other accessories that require reinitialization or code entry following battery disconnect. 11. Demonstrate the use of a memory saver. 12. Pass a battery diagnosis and service assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 5, 9, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Problem Solving and Critical Thinking: 5.2, 5.3, 5.4 Leadership and Teamwork: 9.3 Technical Knowledge and Skills: 10.3 Demonstration and Application: 11.1 **CTE Pathway:** C2.3, C3.5, C3.6, C3.7, C4.3, C7.1, C7.2
K. STARTING SYSTEM DIAGNOSIS AND REPAIR Understand, apply, and evaluate the diagnostic and repair techniques for auto starting system.	1. Describe starter current draw test; determine necessary action. 2. Describe starter circuit voltage drop tests; determine necessary action. 3. Inspect and test starter relays and solenoids; determine necessary action. 4. Demonstrate on the bench how to inspect and test a starter. 5. Explain how to change a starter. 6. Inspect and test switches, connectors, and wires of starter control units; perform necessary actions. 7. Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.	**Career Ready Practice:** 1, 2, 5, 10 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Problem Solving and Critical Thinking:

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(18 Hours)	8. Pass a starting system diagnosis and repair assessment with an 80% score or higher.	5.2, 5.4 Technical knowledge and Skills: 10.3 Demonstration and Application: 11.1 **CTE Pathway:** C2.1, C2.2, C2.3, C2.6, C2.7, C3.5, C3.7, C7.1, C7.3
L. CHARGING SYSTEM DIAGNOSIS AND REPAIR Understand, apply, and evaluate the diagnostic and repair techniques for an auto charging system. (18 Hours)	1. Perform charging system output test; determine necessary action. 2. Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions. 3. Inspect, adjust, or replace generator (alternator) drive belts, pulleys and tensioners, check pulley and belt alignment. 4. Remove, inspect, and install generator (alternator). 5. Form teams and perform charging circuit voltage drop tests; determine necessary action. 6. Describe the operation of charging systems. 7. Test the charging system with proper testing equipment. 8. Pass a charging system 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: 5.2, 5.4 Leadership and Teamwork: 9.3, 9.7 Technical knowledge and Skills: 10.3 **CTE Pathway:** C2.1, C2.2, C2.3, C2.7, C3.5, C3.7, C7.1, C7.3
M. LIGHTING AND INSTRUMENTATION Understand, apply, and evaluate the lighting and instrumentation.	1. Explain the operation of a typical head lamp switch. 2. Compare head light bulb designs and interpret information to make informed decisions. 3. Explain lamp delay and auto dimming systems. 4. Describe and explain the following bulbs: a. brake b. backup c. turn light d. license plate 5. Compare conventional and digital instrumentation systems. 6. Explain the operation of voice alert and recognition systems.	**Career Ready Practice:** 1, 2, 4, 5 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Technology: 4.1, 4.3

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(10 hours)	7. Describe and explain the operation of navigation systems to include emergency services included on automobiles such as the OnStar system. 8. Explain the different types of fuses and fuse box locations. 9. Pass a lighting and instrumentation assessment with an 80% score or higher.	Problem Solving and Critical Thinking: 5.4, Technical Knowledge and Skills: 10.1, 10.3 **CTE Pathway:** C2.3, C3.5, C3.6, C7.1, C7.4
N. HORN, WIPER, AND ACCESSORY SYSTEMS Understand, apply, and evaluate the horn and wiper and accessory systems. (10 hours)	1. Identify the major parts of a windshield wiper system. 2. Explain the operation of the windshield wiper system. 3. Describe and explain the operation of a horn circuit. 4. Identify the major parts of a window system and their function. 5. Identify the major parts of a power door system and their function. 6. Explain the operation of a keyless entry and security system. 7. Identify the major parts of a vehicle restraint system. 8. Pass a horn and wiper and accessory systems assessment with an 80% score or higher.	**Career Ready Practice:** 1, 2, 4 **CTE Anchor:** Academics: 1.0 Communications: 2.1, 2.3 Technology: 4.3 Problem Solving and Critical Thinking: 5.3, 5.4, Technical Knowledge and Skills: 10.1 **CTE Pathway:** C7.6
O. EMPLOYABILITY SKILLS AND RESUME PREPARATION Understand, apply, and evaluate the employability skills and resume preparation desired of administrative assistants.	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	**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

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(4 hours)	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 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	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

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

METHODS AND PROCEDURES

A. Lecture and discussion

B. Demonstration

C. Multimedia presentations

EVALUATION

SECTION A – Orientation – Pass all assignments and exams with a minimum score of 80% or higher.

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

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

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

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

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

SECTION G – Basic Automotive Electricity – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION H – Electrical & Electronic Components – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION I – General Electrical System Diagnosis – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION J – Battery Diagnosis & Service – Pass all assignments and exams with a minimum score of 80% or higher.

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

SECTION L – Charging System Diagnosis & Repair – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION M – Lighting & Instrumentation– Pass all assignments and exams with a minimum score of 80% or higher.

SECTION N – Horn & Wiper & Accessory Systems – Pass all assignments and exams with a minimum score of 80% or higher.

SECTION O – Employability Skills & Resume Preparation – 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.