

Course Outline

Transportation

REVISED: July/2021

Job Title

Automotive Service Technician

Career Pathway:

Systems Diagnostics and Service

Industry Sector:

Transportation

O*NET-SOC CODE:

49-3023.00

CBEDS Title:

Automotive Service

CBEDS No.:

5668

79-90-83

Technology/1: Automotive Systems

Credits: 5

Hours: 90

Course

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 orientation and safety, resource management, measurements, tools and equipment, engine designs, engine cooling systems, engine lubrication systems, engine lubrication systems, basic automotive electricity, charging systems and batteries, starting systems, and employability 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.

Description:

Prerequisites:

Enrollment requires a reading level of 6.0 as measured by the CASAS GOALS test.

NOTE: For Perkins purposes this course has been designated as an **introductory** course.

This course **cannot** be repeated once a student receives a Certificate of Completion.



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

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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

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Instructional techniques or methods could include laboratory techniques, lecture method, 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 takes into account 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 within 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 that it ensures the student will learn at an optimum level.

pp. 7-13

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) is listed on the cover of every CBE course outline. Each Competency Area listed within a CBE outline is assigned hours of instruction per unit.

EVALUATION PROCEDURES

p. 15

The evaluation describes measurable evaluation criteria clearly within the reach of the student. The evaluation indicates anticipated improvement in performances 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.

Transportation Pathway Standards

C. Systems Diagnostics and Service 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 Technology/1: Automotive Systems Course

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>A. ORIENTATION AND SAFETY</p> <p>Understand, apply, and evaluate classroom and workplace policies and procedures used in accordance with federal, state, and local safety and environmental regulations.</p> <p>(2 hours)</p>	<ol style="list-style-type: none"> 1. Describe the scope and purpose of the course. 2. Describe the overall course content as a part of the Linked Learning Initiative. 3. Describe classroom policies and procedures. 4. Identify classroom and workplace first aid and emergency procedures. 5. Describe the different occupations in the Transportation Industry Sector which have an impact on the role of the auto technician. 6. Describe the California Occupational Safety and Health Administration (Cal/OSHA) workplace requirements for auto technicians. 7. Describe the opportunities available for promoting gender equity and the representation of non-traditional populations in automotive science. 8. Explain the impact of Environmental Protection Agency (EPA) legislation on Transportation Industry Sector practices in protecting and preserving the environment. 9. Explain the impact of California Air Resources Board (ARB) legislation on Transportation Industry Sector practices in protecting and preserving the environment. 10. State the Bureau of Automotive Repair (BAR) standards for consumer and environmental protection. 11. Describe and demonstrate the use of the Safety Data Sheet (SDS) as it applies to the automotive industry. 12. Identify the safety items required by federal, state, and local regulations. 13. Describe the role of the Automotive Service Excellence (ASE) Education Foundation in auto technician training. 14. Describe and demonstrate the ASE standards regarding proper use of protective: <ol style="list-style-type: none"> a. clothing and gloves in an auto shop b. respiratory gear in an auto shop c. eye gear in an auto shop d. ventilation in an auto shop e. handling, storage, and disposal of chemicals and hazardous materials used in an auto shop. 15. Pass the safety exam with 100% accuracy. 	<p>Career Ready Practice: 1, 2, 7, 9, 12</p> <p>CTE Anchor: Communications: 2.1, 2.5 Career Planning and Management: 3.4 Problem Solving and Critical Thinking: 5.1, 5.4 Health and Safety: 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 Ethics and Legal Responsibilities: 8.2, 8.3, 8.5, 8.6 Leadership and Teamwork: 9.5, 9.6, 9.7 Technical Knowledge and Skills: 10.1, 10.2, 10.4</p> <p>CTE Pathway: C1.1, C1.2, C1.4, C1.5, C4.2</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>B. RESOURCE MANAGEMENT</p> <p>Understand, apply, and evaluate the resource management principles and techniques in the auto repair and maintenance business.</p> <p>(1 hour)</p>	<ol style="list-style-type: none"> 1. Define the following: <ol style="list-style-type: none"> a. resources b. management c. sustainability 2. Describe and list specific examples of effective management of the following resources in the auto repair and maintenance business: <ol style="list-style-type: none"> a. time b. materials c. personnel 3. Describe the benefits of effective resource management in the auto repair and maintenance business: <ol style="list-style-type: none"> a. profitability b. sustainability c. company growth 4. Describe the economic benefits and liabilities of managing resources in an environmentally responsible way. 	<p>Career Ready Practice: 1, 2, 12</p> <p>CTE Anchor: Communications: 2.1 Career Planning and Management: 3.7 Problem Solving and Critical Thinking: 5.1 Responsibility and Flexibility: 7.1, 7.2, 7.4, 7.6 Technical Knowledge and Skills: 10.1, 10.2 Demonstration and Application: 11.1</p> <p>CTE Pathway: C1.1, C5.2, C5.3, C5.4</p>
<p>C. MEASUREMENTS</p> <p>Understand, apply, and evaluate the principles of precision measurement and the use of precision measuring instruments.</p> <p>(5 hours)</p>	<ol style="list-style-type: none"> 1. Identify and describe the features and functions of the following automotive measuring tools: <ol style="list-style-type: none"> a. steel ruler b. Vernier calipers c. inside calipers d. outside calipers e. micrometer gauges f. telescoping gauges g. hole gauges h. plastic gauges i. dial indicator gauge 2. Describe and demonstrate proper use of a conversion chart. 	<p>Career Ready Practice: 1, 2, 5</p> <p>CTE Anchor: Communications: 2.1 Problem Solving and Critical Thinking: 5.1 Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: C2.4, C2.5, C2.7</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>D. TOOLS AND EQUIPMENT</p> <p>Understand, apply, and evaluate the use, maintenance, and storage techniques for automotive tools and equipment.</p> <p>(5 hours)</p>	<ol style="list-style-type: none"> 1. Identify and describe the features and functions of the most common <ol style="list-style-type: none"> a. automotive hand tools b. power tools and equipment 2. Describe and demonstrate the following: <ol style="list-style-type: none"> a. selection of the appropriate hand, power tools, and equipment for each job b. procedures for checking out hand, power tools, and equipment from the tool room c. safe use of the most common hand, power tools and equipment in the auto shop 3. Identify and describe the features and functions of the most common: <ol style="list-style-type: none"> a. automotive hand tools b. power tools and equipment 4. Describe and demonstrate the following: <ol style="list-style-type: none"> a. selection of the appropriate hand, power tools, and equipment for each job b. procedures for checking out hand, power tools, and equipment from the tool room c. safe use of the most common hand, power tools and equipment in the auto shop 	<p>Career Ready Practice: 1, 2, 5, 11</p> <p>CTE Anchor: Communications: 2.1 Problem Solving and Critical Thinking: 5.1, 5.2 Health and Safety: 6.3, 6.4 Technical Knowledge and Skills: 10.2 Demonstration and Application: 11.1</p> <p>CTE Pathway: C1.4, C2.2</p>
<p>E. ENGINE DESIGN</p> <p>Understand, apply, and evaluate the principles of the internal combustion engine design.</p> <p>(10 hours)</p>	<ol style="list-style-type: none"> 1. Identify and describe the features and functions of the following: <ol style="list-style-type: none"> a. major parts of an automobile engine b. different types of cylinder configurations c. valve arrangements <ol style="list-style-type: none"> i. overhead valve ii. overhead cam iii. double overhead cam iv. multiple valve heads 2. Define four-stroke cycle. 3. Explain advantages and disadvantages of the various cylinder configurations. 	<p>Career Ready Practice: 1, 2, 5, 11</p> <p>CTE Anchor: Communications: 2.1 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: C1.5, C3.1, C6.1, C6.2, C6.3, C6.4</p>
<p>F. ENGINE COOLING SYSTEMS</p> <p>Understand, apply, and evaluate the principles and procedures used for engine</p>	<ol style="list-style-type: none"> 1. Identify and describe the features and functions of the following cooling systems: <ol style="list-style-type: none"> a. air cooling system b. liquid cooling system 2. Identify and describe the features and functions of the following liquid cooling system components: 	<p>Career Ready Practice: 1, 2, 4, 5, 11</p> <p>CTE Anchor: Communications:</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>cooling systems.</p> <p>(15 hours)</p>	<ol style="list-style-type: none"> 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 <ol style="list-style-type: none"> 3. Describe the function of antifreeze/coolant. 4. Describe and demonstrate the following: <ol style="list-style-type: none"> a. diagnosing common cooling system problems and their symptoms b. replacing faulty cooling system components 	<p>2.1 Problem Solving and Critical Thinking: 5.2, 5.3, 5.4 Technical Knowledge and Skills: 10.1, 10.2</p> <p>CTE Pathway: C3.2, C3.7, C6.1, C6.2, C7.5, C8.6</p>
<p>G. ENGINE LUBRICATION SYSTEMS</p> <p>Understand, apply, and evaluate the principles and procedures used for lubrication systems.</p> <p>(15 hours)</p>	<ol style="list-style-type: none"> 1. Identify and describe the features and function of the lubrication system and components: <ol style="list-style-type: none"> a. oil pan/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 2. Describe the following: <ol style="list-style-type: none"> 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 3. Describe and demonstrate the following: <ol style="list-style-type: none"> a. diagnosing common lubrication system problems b. repairing various lubrication system malfunctions c. performing engine lubrication system service 	<p>Career Ready Practice: 1, 2, 4, 5, 11</p> <p>CTE Anchor: Communications: 2.1 Problem Solving and Critical Thinking: 5.2, 5.3, 5.4 Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: C3.7, C5.6, C6.2</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>H. BASIC AUTOMOTIVE ELECTRICITY</p> <p>Understand, apply, and evaluate the principle of automotive electricity.</p> <p>(15 hours)</p>	<ol style="list-style-type: none"> 1. Define the following: <ol style="list-style-type: none"> a. Ohm’s Law b. electricity c. voltage d. current e. resistance f. watts g. alternating current (AC) h. direct current (DC) i. conductor j. insulators k. magnetism/induction l. electronic diagnostic m. relay circuits 2. Identify and describe the features and functions of the following: <ol style="list-style-type: none"> 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. 4. Discuss and explain multi-meter training 	<p>Career Ready Practice: 1, 2, 4, 5</p> <p>CTE Anchor: Communications: 2.1 Problem Solving and Critical Thinking: 5.1, 5.2, 5.3, 5.4 Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: C2.3, C2.4, C3.4, C3.5, C3.7, C6.4, C7.1, C7.2, C7.7</p>
<p>I. CHARGING SYSTEMS AND BATTERIES</p> <p>Understand, apply, and evaluate the principles and procedures used for charging systems and batteries.</p> <p>(10 hours)</p>	<ol style="list-style-type: none"> 1. Identify and describe the features and functions of the following charging systems and components: <ol style="list-style-type: none"> a. battery b. alternator c. voltage regulator d. charging system gauge or warning light e. power (train) control module f. memory saver 2. Describe how the AC current from the alternator is changed to DC current. 3. Describe and demonstrate the following: <ol style="list-style-type: none"> 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 	<p>Career Ready Practice: 1, 2, 4, 5</p> <p>CTE Anchor: Communications: 2.1 Problem Solving and Critical Thinking: 5.2, 5.3, 5.4 Health and Safety: 6.6 Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: C2.3, C2.7, C3.7, C7.2, C7.4, C8.6</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
<p>J. STARTING SYSTEMS</p> <p>Understand, apply, and evaluate the principles and procedures used for starting systems.</p> <p>(10 hours)</p>	<ol style="list-style-type: none"> 1. Identify and describe the features and functions of the following starting systems and components: <ol style="list-style-type: none"> a. battery b. ignition switch c. neutral safety switch d. starter relay e. starter solenoid f. battery cables g. starter motor h. immobilizer 2. Describe and demonstrate the following: <ol style="list-style-type: none"> a. understanding a simple starting system circuit b. diagnosing common starting system problems c. removing and replacing a starter motor 	<p>Career Ready Practice: 1, 2, 4, 5</p> <p>CTE Anchor: Communications: 2.1 Problem Solving and Critical Thinking: 5.2, 5.3, 5.4 Health and Safety: 6.6 Technical Knowledge and Skills: 10.1</p> <p>CTE Pathway: C3.7, C6.3, C6.4, C8.6</p>
<p>K. EMPLOYABILITY SKILLS</p> <p>Understand, apply, and evaluate the employability skills required in auto repair and maintenance.</p>	<ol style="list-style-type: none"> 1. Describe employer requirements for the following: <ol style="list-style-type: none"> a. punctuality b. attendance c. proper attire d. attitude toward work e. quality of work f. teamwork g. timeliness h. responsibility i. communication skills j. computer skills and software applications 2. Explain the importance of the continuous upgrading of job skills through lifelong learning. 3. Identify pre-professional and professional industry organizations and discuss the employability benefits of belonging. 4. State the need to adapt to varied roles and responsibilities in the workplace. 5. Describe the importance of personal integrity and ethical behavior in the workplace. 6. Describe customer service as a method of building permanent relationships between the organization and the client. 7. Identify conflict resolution strategies for a variety of workplace situations. 8. Describe ways to demonstrate respect for individual and cultural differences and for the attitudes and feelings of others. 9. Identify potential employers through traditional and internet sources. 	<p>Career Ready Practice: 1, 2, 3, 4, 8</p> <p>CTE Anchor: Communications: 2.4 Career Planning and Management: 3.1, 3.2, 3.3 Health and Safety: 6.2 Responsibility and Flexibility: 7.2, 7.3, 7.7 Ethics and Legal Responsibilities: 8.3, 8.4 Leadership and Teamwork: 9.2, 9.3, 9.4 Demonstration and Application: 11.2</p> <p>CTE Pathway:</p>

COMPETENCY AREAS AND STATEMENTS	MINIMAL COMPETENCIES	STANDARDS
(2 hours)	<ol style="list-style-type: none"> 10. Describe the role of electronic social networking in job search. 11. Design sample résumés and cover letters. 12. Explain the importance of filling out a job application legibly, with accurate and complete information. 13. Describe the common mistakes made on job applications. 14. Complete sample job application forms correctly. 15. State the importance of <ol style="list-style-type: none"> a. enthusiasm in the interview and on a job b. appropriate appearance on the job c. continuous upgrading of job skills d. clean driver's record e. background check 16. Create a career plan that builds on existing interests, skills, and abilities. 17. Identify the informational materials, resources, and test knowledge needed to be successful in an interview. 18. Describe and demonstrate appropriate interviewing techniques. 	C5.4, C5.5

SUGGESTED INSTRUCTIONAL MATERIALS and OTHER RESOURCES

TEXTBOOKS

Duffy, James E. Modern Automotive Technology, 9th Edition. Goodheart-Willcox Publishing, 2017.

VanGelder, Kirk, Fundamentals of Automotive Technology, Principles and Practice, 2nd Edition, CDX Learning Systems, 2018.

Stockel, Martin W., Stockel, Martin T., and Johnson, Chris, Auto Fundamentals, 12th Edition, Goodheart-Wilcox, 2020.

Hadfield, Chris and Witthauer, John. Basic Automotive Service & Systems, 6th Edition. Cengage Learning, 2021.

Halderman, James. Automotive Technology 6th Edition. Pearson , 2020

Johansson, Chris and Martin T. Stockel. Auto Fundamentals, 11th Edition. Goodheart-Willcox Publisher, 2015.

RESOURCES

Employer Advisory Board members

California Career Technical Education Model Curriculum Standards

<https://www.cde.ca.gov/ci/ct/sf/documents/transportation.pdf>

Automotive Retailing Today (ART) 8400 Westpark Dr., MS 2, McLean, VA 22102. Phone: (703) 556-8578.

Automotive Youth Educational Systems (AYES) 50 W. Big Beaver, Suite 145, Troy, MI 48084. Phone: (248) 526-1750. Fax: (248) 526-1751.

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

Automotive Service Excellence (ASE) Education Foundation 101 Blue Seal Dr. SE, Suite 101, Leesburg, VA 20175. Phone (703) 669-6650 Fax (703) 669-6125. <https://www.aseeducationfoundation.org/>

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

www.familycar.com

www.freeonlineautorepair.com/automotive_fuel_system.html

www.fueleconomy.gov

COMPETENCY CHECKLIST

TEACHING STRATEGIES and EVALUATION

METHODS AND PROCEDURES

- A. Lecture and discussion
- B. Multimedia presentations
- C. Visual aids
- D. Projects
- E. Individualized instruction

EVALUATION

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

SECTION B – Resource Management – Pass all assignments and exams on principles of resource management with a minimum score of 80% or higher.

SECTION C – Measurements – Pass all assignments and exams on measurements with a minimum score of 80% or higher.

SECTION D – Tools and Equipment – Pass all assignments and exams on tools and equipment with a minimum score of 80% or higher.

SECTION E – Engine Designs– Pass all assignments and exams on engine designs: domestic with a minimum score of 80% or higher.

SECTION F – Engine Cooling Systems – Pass all assignments and exams on engine cooling systems with a minimum score of 80% or higher.

SECTION G – Engine Lubrication Systems – Pass all assignments and exams on engine lubrication systems with a minimum score of 80% or higher.

SECTION H – Basic Automotive Electricity – Pass all assignments and exams on basic automotive electricity with a minimum score of 80% or higher.

SECTION I – Charging Systems and Batteries – Pass all assignments and exams on charging systems with a minimum score of 80% or higher.

SECTION J – Starting Systems – Pass all assignments and exams on starting systems with a minimum score of 80% or higher.

SECTION K –Employability Skills – Pass all assignments and exams on employability skills 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 component 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 a 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.

LQOCATE – 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.

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