

Automotive General Service Technician 3

COURSE OUTLINE

DESCRIPTION:

Automotive General Service Technician 3 builds on Automotive General Service Technician 2 by equipping students with hands-on training and knowledge of automotive repair and maintenance for employment as Automotive Service Technicians. Students will continue to demonstrate customer service skills and safety procedures in the workplace while troubleshooting/testing and performing repairs related to engine performance, suspension and steering, brakes, electrical and emission systems, heating and air conditioning. Successful demonstration of Automotive General Service Technician competencies will assist students with National Automotive Technicians Education Foundation (NATEF) certification. Activities in this course include work-based learning that connects students to industry and the local community. Students must successfully complete Automotive General Service Technician 1 and Automotive General Service Technician 2 as part of the minimum requirements for articulation.

INFORMATION:

PRE-REQUISITE: Automotive General Service Technician 2

LENGTH: One Year

SECTOR: Transportation

PATHWAY: System Diagnostic and Service

ARTICULATED: No

UC A-G APPROVAL: No

O*NET SOC CODES:

41-2022.00 Specialists Parts Salesperson

49-3023.00 Automotive Service Technicians and Mechanics

49-3031.00 Bus and Truck Mechanics and Diesel Engine Specialists

53-6031.00 Automotive and Watercraft Service Attendants

Orientation
<ul style="list-style-type: none"> A. Introduce the course and facilities. B. Discuss the syllabus and major objectives. C. Explain applicable classroom management procedures, the ROP Student Rules of Conduct, and any operational guidelines. D. Review instructor/student expectations. E. Explain enrollment and attendance requirements and procedures. F. Review grading and student evaluation procedures. G. Discuss the community classroom aspect of the program if applicable. H. Discuss the “next steps” related to additional education, training, and employment. I. Review classroom safety, emergency and disaster procedures.
1. Communication Skills
<ul style="list-style-type: none"> A. Demonstrate positive verbal communication skills using appropriate vocabulary, demeanor, and vocal tone in the classroom and/or worksite. B. Read and interpret written information and directions. C. Practice various forms of written communication appropriate to the occupation. D. Practice positive body language skills. E. Practice professional verbal skills for resolving a conflict. F. Demonstrate active listening skills including techniques for checking for understanding, and for obtaining clarification of directions.
2. Interpersonal Skills
<ul style="list-style-type: none"> A. Demonstrate positive teamwork skills by contributing to a group effort. B. Practice the importance of diversity awareness and sensitivity in the workplace. C. Define sexual harassment in the workplace and identify the employee’s role and responsibility. D. Practice participation skills. E. Identify different personality types and strategies for working effectively with each type. F. Practice business and social etiquette skills appropriate to the occupation. G. Discuss the role of business and personal ethics in the decision-making process. H. Evaluate various job-related scenarios and justify decisions based on ethics. I. Demonstrate flexibility and adaptability in working with others. J. Demonstrate the use of time management skills.

3. Employability Skills

- A. Demonstrate appropriate attendance and punctuality practices for the classroom and worksite if applicable.
- B. Prepare a resume, cover letter, and job application forms.
- C. Demonstrate interviewing techniques using appropriate tone and body language.
- D. Demonstrate appropriate dress and grooming standards in seeking employment and for the workplace.
- E. Identify strategies for employment retention.
- F. Analyze the impact of social networking on employability.
- G. Identify the need for continuing education, professional development, and professional growth in chosen field.
- H. Identify appropriate procedures for leaving a job.
- I. Identify sources of job information, including electronic sources.
- J. Review company policies and current trends in employee compatibility screening, drug screening, and background checks.

4. Leadership

- A. Define leadership and identify the responsibilities, competencies, and behaviors of successful leaders.
- B. Work with peers to promote divergent and creative perspectives.
- C. Demonstrate how to organize and structure work, individually and in teams, for effective performance and the attainment of goals.
- D. Explain multiple approaches to conflict resolution and their appropriateness for a variety of situations in the workplace.
- E. Employ ethical behaviors and actions that positively influence others.
- F. Use a variety of means to positively impact the direction and actions of a team or organization.
- G. Analyze the short-term and long-term effects a leader's actions and attitudes can have on productivity, morale, and organizational culture.

5. Personal and Occupational Safety

- A. Demonstrate procedures to be followed in the case of emergencies.
- B. Discuss ways to report a potential safety hazard to a supervisor.
- C. Identify and discuss cyber ethics, cyber safety, and cyber security.
- D. Apply personal safety practices to and from the job.
- E. Describe the procedure for reporting a work-related hazard or injury.
- F. Recognize the effects of substance abuse in the workplace.
- G. Recognize good housekeeping as a safety issue.
- H. Identify safety hazards commonly found in the workplace environment.
- I. Explain the importance of CAL-OSHA.
- J. Define and discuss ergonomics in relation to the working environment.

K. Identify the electrical hazards of working with electronic equipment.

6. Shop and Personal Safety

- A. Locate and demonstrate knowledge of material safety data sheets (MSDS).
- B. Comply with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
- C. Apply general shop safety rules and procedures including proper ventilation procedures in lab/shop area.
- D. Utilize safe procedures for handling of tools and equipment.
- E. Apply specific vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
- F. Use proper procedures for safe lift operation.
- G. Demonstrate proper handling of hazardous materials and fire safety equipment.
- H. Identify marked safety areas and the location of the posted evacuation routes.
- I. Wear appropriate clothing, accessories and hairstyles for shop/lab activities.
- J. Demonstrate knowledge of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and high voltage circuits (including hybrid vehicles, high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).

7. Suspension and Steering Systems

- A. Diagnose and repair various types of steering and suspension system operation and components.
- B. Disable and enable supplemental restraint system (SRS).
- C. Flush, fill, and bleed power steering system.
- D. Inspect and replace power steering hoses and fittings.
- E. Replace power steering pump filter(s).
- F. Perform pre-alignment inspection and measure vehicle ride height; determine necessary action.
- G. Perform pre-alignment inspection and measure vehicle ride height; determine necessary action.

8. Brakes

- A. Check operation of brake stop light system.
- B. Identify traction control/vehicle stability control system components.
- C. Retrieve and record diagnostic trouble codes related to ABS and traction control systems.
- D. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS).
- E. Check brake pedal travel with, and without, engine running to verify proper power booster operation.
- F. Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.

9. Electrical/Electronic Systems

- A. Use wiring diagrams to trace electrical/electronic circuits.
- B. Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance.
- C. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
- D. Check operation of electrical circuits with a test light.
- E. Check operation of electrical circuits with fused jumper wires.
- F. Replace electrical connectors and terminal ends.
- G. Remove and re-install generator (alternator).
- H. Perform starter current draw test; determine necessary action.
- I. Remove and install starter in a vehicle.
- J. Perform functional test including AMP draw test.
- K. Test switches, connectors, and wires of starter control circuits; determine necessary action.
- L. Adjust and aim headlights for older model cars.
- M. Identify safety precautions associated with high-intensity discharge headlights.
- N. Disable and enable airbag system for vehicle service; verify indicator lamp operation.
- O. Remove and reinstall door panel with caution.
- P. Describe the operation of keyless entry/remote-start systems.

10. Heating and Air Conditioning

- A. Replace A/C compressor drive belts, pulleys, and tensioners; determine necessary action.
- B. Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions.
- C. Inspect A/C condenser for airflow restrictions; determine necessary action.
- D. Inspect A/C-heater ducts, doors, hoses, and outlets; perform necessary action.
- E. Identify additional sources of A/C system odors.
- F. Conduct a performance test.

11. Engine Performance

- A. Compare and contrast the two-stroke and four-stroke cycles.
- B. Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.
- C. Perform cylinder power balance test; determine necessary action.
- D. Perform cylinder cranking and running compression tests; determine necessary action.
- E. Perform cylinder leakage test; determine necessary action.
- F. Inspect secondary ignition components for wear and damage.
- G. Identify the Clean Air Act Amendment and explain the OBD II provision.

- H. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.
- I. Describe the importance of operating OBD II monitors for repair verification.

12. Exhaust Emissions Systems

- A. Explain compliance procedures for state and federal exhaust emission regulations.
- B. Replace fuel filter(s) and ensure use of personal protective equipment.
- C. Inspect, test, and replace components of the exhaust gas recirculation system such as tubing, exhaust passages, vacuum lines, pressure controls, filters, and hoses.
- D. Test and inspect electrical/electronic sensors, controls and wiring in exhaust gas recirculation systems.
- E. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action.
- F. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; repair or replace as needed.
- G. Check diesel exhaust fluid (DEF).
- H. Inspect, test, and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.
- I. Explain the purpose and function of PCV.
- J. Perform diagnostic testing to assess malfunctions in the exhaust gas recirculation system and determine any necessary repairs.

13. Microcomputer Applications in Automotive Systems

- A. Discuss the operation and use of scanning tools in communicating with automotive and personal computers.
- B. Diagnose an electronic system circuit problem using a scan tool to determine necessary action.
- C. Check modular communication errors using a scan tool.
- D. Summarize the operation and function of an automotive microprocessor and describe the different types of automotive computer input and output signals.
- E. Explain the function and operation of an automotive microprocessor.
- F. Identify the different types of automotive computer input and output signals.
- G. Describe the terms; read only memory (ROM), programmable read only memory (PROM), keep alive memory (KAM) and random-access memory (RAM).
- H. Compare and contrast volatile and nonvolatile memory.
- I. Define adaptive strategy.
- J. Explain why an analog/digital (A/D) converter is necessary in an automotive fuel management computer.
- K. Identify the different types of automotive computer output devices and explain how they operate.
- L. Discuss the causes of emission malfunctions with stored diagnostic trouble codes.
- M. Access and use service information to perform step-by-step diagnosis of assorted systems
- N. Diagnose the causes of malfunctions of interrelated systems, such as cruise controls, security alarms, suspension controls, and traction

controls.

14. Restraint and Navigation Systems

- A. Demonstrate knowledge and basic skill in the operation, functionality, diagnosis, and repair of automotive safety, security, and navigation systems.
- B. Explain how to inspect and service seat belts.
- C. Summarize the operation of restraint system sensors, inflator modules, and electronic control modules.
- D. Describe safety procedures for air bag diagnosis, repair, and replacement.
- E. Describe testing and repair procedures for passive restraint systems.
- F. Disable and enable supplemental restraint systems according to manufacturer's specifications.
- G. Describe how to service an air bag controller.
- H. Explain the operation of vehicle navigation systems.

Key Assignments

Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
1. Students will participate in mock interviews that represent current industry practices (e.g., skills demonstrations, resumes, applications, portfolios, personal websites, etc.).	1A, B, D 3B, C, D, I, J	2 3 10	2 3		LS 11-12.6 SLS 11-12.2
2. Students will use diagnostic information to repair and align steering and suspension components, while taking and demonstrating safety precautions.	1A - F 2A, D, I, J 3A, D 5B, G 6 A-J 7 A-G	1 4 5 11 12	2 4 5 6 10	C2.0 C3.0 C4.0 C8.0	LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4
3. Students will diagnose and repair brakes, while taking and demonstrating safety precautions.	1A - F 2A, D, I, J 3A, D 5B, G 6 A-J 8 A-F	1 4 5 11 12	2 4 5 6 10	C2.0 C3.0 C4.0 C8.0	LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4
4. Students will diagnose and repair basic automotive electrical systems, while taking and demonstrating safety precautions.	1A - F 2A, D, I, J 3A, D 5B, G 6 A-J 9 A-P	1 4 5 11 12	2 4 5 6 10	C2.0 C3.0 C4.0 C7.0	LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4 A-CED 4 PS 3.A
5. Students will diagnose and repair basic automotive HVAC systems: students will write a work order for the scheduled maintenance of a heating and cooling system, conduct a general preventative maintenance inspection and perform necessary action. When work is completed, student will update the vehicles maintenance record.	1A - F 2A, D, I, J 3A, D 5B, G 6 A-J 10 A-F	1 4 5 11 12	2 4 5 6 10	C2.0 C3.0 C4.0 C7.0	LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4 PS 3.B
6. Students will diagnose engine operation and performance:	1A - F 2A, D, I, J	1 4	2 4	C2.0 C3.0	LS 11-12.6 WS 11-12.6

Assignment	Competencies	Career Ready Practices	Anchor Standards	Pathway Standards	CCSS
students will write a work order for the maintenance of a car engine, inspect the performance of the engine and take corrective action where necessary. When work is completed, students will update the vehicles maintenance record.	3A, D 5B, G 6 A-J 11 A-J	5 11 12	5 6 10	C4.0 C6.0	WS 11-12.7 RSTS 11-12.4 RLST 11-12.3 RLST 11-12.10 SEP 4, 8 CC 2 ETS 1.B
7. Students will conduct a general preventative maintenance inspection of the exhaust and emissions systems (such as hoses, pipes, exhaust system hangers, filters) and take appropriate action as needed. When work is completed, the student will accurately update the vehicle's maintenance record.	1A - F 2A, D, I, J 3A, D 5B, G 6 A-J 12 A-J	1 4 5 11 12	2 4 5 6 10	C2.0 C3.0 C4.0 C8.0	LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4
8. Access and use service information to perform step-by-step diagnosis of assorted systems. Then diagnose the causes of malfunctions of interrelated systems, such as cruise controls, security alarms, suspension controls, and traction controls.	1A - F 2A, D, I, J 3A, D 5B, G 6 A-J 13 A-N	1 2 11 12	4 5 6 10	C1.0 C2.0 C4.0 C5.0	WS 11-12.6 WS 11-12.7 RSTS 11-12.4 RLST 11-12.3 RLST 11-12.10 SEP 4, 8 CC 2 LS 2.D PS 4.C WS 11-12.4
9. Access and use manufacturer's specification to perform step-by-step diagnosis and service or repair restraint and navigation systems.	1A - F 2A, D, I, J 3A, D 5B, G 6 A-J 14 A-H	1 4 5 11 12	2 4 5 6 10	C2.0 C3.0 C4.0 C6.0	LS 11-12.6 WS 11-12.6 WS 11-12.7 RSTS 11-12.4 RLST 11-12.3 RLST 11-12.10 SEP 4, 8 CC 2 ETS 1.B

Standards Assessed in this Program

Career Ready Practices

1. Apply appropriate technical skills and academic knowledge.
2. Communicate clearly, effectively, and with reason.
3. Develop an education and career plan aligned to personal goals.
4. Apply technology to enhance productivity.
5. Utilize critical thinking to make sense of problems and persevere in solving them.
7. Act as a responsible citizen in the workplace and the community.
8. Model integrity, ethical leadership, and effective management.
9. Work productively in teams while integrating cultural/global competence.
10. Demonstrate creativity and innovation.
11. Employ valid and reliable research strategies.
12. Understand the environmental, social, and economic impacts of decisions.

Anchor Standards

2.0 Communications

- Acquire and use accurately 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 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 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 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 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.

10.0 Technical Knowledge and Skills

- Apply essential technical knowledge and skills common to all pathways in the sector following procedures when carrying out experiments or performing technical tasks.

Pathway Standards

Transportation - Systems Diagnostics and Service Pathway

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.

Common Core State Standards

ENGLISH LANGUAGE ARTS

Language Standards

LS 11-12.6: Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the (career and college) readiness level, demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

LS 2.D

Reading Standards for Literacy in Science and Technical Subjects

- RLST 11-12.3:** Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
- RLST 11-12.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context.
- RLST 11-12.10:** By the end of grade 12 read and comprehend science/technical texts in the grades 11-12 text complexity band independently and proficiently.

Speaking and Listening Standards

- SLS 11-12.2:** Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions, and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.
- SLS 11-12.1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners, building on others ideas and expressing their own clearly and persuasively.
- SLS 11-12.1d:** Respond thoughtfully to diverse perspectives, synthesize comments, claims and evidence made on all sides of an issue, resolve contradictions when possible, and determine what additional information or research is required to deepen the investigation or complete the work.

Writing Standards

- WS 11-12.4:** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- WS 11-12.6:** Use technology, including the Internet, to produce, publish, and update individual or shared writing products in response to ongoing feedback including new arguments and information.
- WS 11-12.7:** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem, narrow or broaden the inquiry when appropriate, synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

MATHEMATICS

Algebra- Creating Equations

- A-CED 4:** Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R .

SCIENCE

Crosscutting Concept

- CC 2:** Cause and effect: Mechanism and explanation

Engineering, Technology, and the Applications of Science

Automotive 3: Includes updates from 2021/22 advisory and NATEF alignment

ETS 1.B: Developing Possible Solutions

Physical Sciences

PS 3.A: Definitions of Energy

PS 3.B: Conservation of Energy and Energy Transfer

PS 4.C: Information Technologies and Instrumentation

Scientific and Engineering Practices

SEP 4: Analyzing and interpreting data

SEP 8: Obtaining, evaluating, and communicating information