Maryland CTE Programs of Study

Automotive Technology I (2025)

GENERAL REQUIREMENTS. This course is recommended for students in Grades 10-12. Prerequisite: Automotive Basics. Students shall be awarded one credit for successful completion of this course. 1

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INTRODUCTION. 2

A Career and Technical Education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions. 2.A

B The Supply Chain and Transportation Career Cluster focuses on planning, management, and movement of people, materials, and goods by road, pipeline, air, rail, and water and related professional support services such as transportation infrastructure planning and management, logistics services, mobile equipment, and facility maintenance. 2.B

C Automotive Technology I: Maintenance and Light Repair includes knowledge of the major automotive systems and the principles of diagnosing and servicing these systems. This course includes applicable safety and environmental rules and regulations. In Automotive Technology I: Maintenance and Light Repair, students will gain knowledge and skills in the repair, maintenance, and diagnosis of vehicle systems. This study will allow students to reinforce, apply, and transfer academic knowledge and skills to a variety of interesting and relevant activities, problems, and settings. The focus of this course is to teach safety, tool identification, proper tool use, and employability. 2.C

D Students will participate in at least two Career Awareness Work-Based Learning experiences in this course, which might include informational interviews or job shadowing relevant to the program of study. 2.D

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E **Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.** 2.E

KNOWLEDGE AND SKILLS. 3

A **The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:** 3.A

1. Demonstrate knowledge of the technical knowledge and skills related to health and safety in the workplace such as wearing safety glasses and other personal protective equipment (PPE) and maintaining safety data sheets (SDS). 3.A.1
2. Identify career and employment opportunities, including entrepreneurship opportunities, and internships and industry-recognized certification requirements for the field of automotive technology. 3.A.2
3. Demonstrate the principles of group participation, team concept, and leadership related to citizenship and career preparation. 3.A.3
4. Apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in the automotive technology industry. 3.A.4
5. Discuss certification opportunities. 3.A.5
6. Discuss response plans to emergency situations. 3.A.6
7. Identify employers' expectations and appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills. 3.A.7
8. Develop personal goals, objectives, and strategies as part of a plan for future career and educational opportunities. 3.A.8

B **The student demonstrates academic skills related to the requirements of automotive technology. The student is expected to:** 3.B

1. Demonstrate effective oral communication skills with individuals from various cultures such as fellow students, coworkers, and customers. 3.B.1
2. Demonstrate effective written communication skills, including documenting on a repair order the customer concern/complaint, root cause of the failure, and corrective action to complete the repair. 3.B.2
3. Demonstrate mathematical skills in performing addition, subtraction, multiplication, division, and measurements using decimals and fractions in the metric and U.S. standard systems as appropriate. 3.B.3

C **The student demonstrates technical knowledge and skills related to the manufacturer preventative maintenance schedule. The student is expected to:** 3.C

1. Locate the manufacturer recommended preventative maintenance schedule. 3.C.1
2. Perform a preventative maintenance inspection of vehicle systems, including engine, fuel, lubrication, cooling, electrical, suspension, drive train, and air-conditioning systems. 3.C.2

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3 Describe the function of the automotive chassis components, including braking, steering, transmission, drive train, and suspension systems. 3.C.3

4 Locate, read, and interpret service repair information such as schematics, charts, diagrams, graphs, parts catalogs, and technical bulletins. 3.C.4

5 Use published specifications to diagnose component wear and determine necessary repairs. 3.C.5

6 Identify the appropriate oil viscosity and capacity. 3.C.6

7 Verify operation of the instrument panel engine warning indicators. 3.C.7

8 Inspect engine assembly and document findings of fuel, oil, coolant, and other leaks. 3.C.8

9 Perform common fastener and thread repair, including removing broken bolt, restoring internal and external threads, and repairing internal threads with thread insert. 3.C.9

10 Inspect, replace, and adjust drive belts, tensioners, and pulleys. 3.C.10

11 Perform engine oil and filter change. 3.C.11

12 Explain and perform a "jump-start" of a vehicle using jumper cables and a booster battery or an auxiliary power supply according to manufacturer recommended procedures. 3.C.12

D The student demonstrates the functions and applications of the tools, equipment, technologies, and materials used in automotive technology. The student is expected to: 3.D

1 Demonstrate the proper use of hand and power tools and equipment commonly employed in the maintenance and repair of vehicles. 3.D.1

2 Discuss the proper handling and disposal of environmentally hazardous materials used in servicing vehicles. 3.D.2

E The student applies the technical knowledge and skills related to brakes in simulated or actual work situations. The student is expected to: 3.E

1 Explains Pascal's Theory of Hydraulics as it relates to the brake system. 3.E.1

2 Inspect brake system components, including master cylinder, brake lines, wheel cylinders, calipers, and flexible hoses and fittings, for external leaks and proper operation. 3.E.2

3 Inspect, measure, and refinish brake drum diameter to manufacturer specifications. 3.E.3

4 Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates. 3.E.4

5 Lubricate, reassemble, and pre-adjust brake shoes and parking brake. 3.E.5

6 Remove, inspect for damage or wear, clean, lubricate, and reassemble pads and retain hardware, caliper assembly, and mounting components such as slides and pins for proper operation. 3.E.6

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7 Refinish a rotor on and off a vehicle and measure final rotor thickness with manufacturer specifications. 3.E.7

8 Retract and re-adjust caliper piston on an integral parking brake system. 3.E.8

9 Check brake pedal travel with, and without, engine running to verify proper power booster operation. 3.E.9

10 Check brake pedal travel with, and without, engine running to verify proper power booster operation. 3.E.10

11 Check vacuum supply from a manifold or auxiliary pump to vacuum-type brake power booster. 3.E.11

12 Describe the operation of a regenerative braking system. 3.E.12

13 Use a scan tool to retrieve and record anti-lock brake system (ABS) diagnostic trouble codes and observe wheel-speed sensor data; clear codes as applicable. 3.E.13

14 Measure brake rotor lateral runout and parallelism with appropriate tools and compare results to manufacturer specifications to determine serviceability. 3.E.14

F The student applies the technical knowledge and skills related to electrical systems in simulated or actual work situations. The student is expected to: 3.F

1 Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity as defined by Ohm's Law. 3.F.1

2 Demonstrate proper use of a digital multi-meter (DMM) when measuring source voltage, voltage drop, current flow, resistance, and ground circuits. 3.F.2

3 Use wiring diagrams to trace electrical/electronic circuits. 3.F.3

4 Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. 3.F.4

5 Confirm proper battery capacity for vehicle application and perform battery capacity test. 3.F.5

6 Perform battery state-of-charge test. 3.F.6

7 Inspect and clean the battery, fill battery cells, and check battery cables, connectors, clamps, and holddowns. 3.F.7

8 Perform starter current draw test. 3.F.8

9 Inspect and test fusible links, circuit breakers, fuses, and relays. 3.F.9

10 Perform charging system output test. 3.F.10

11 Inspect, adjust, or replace generator/alternator drive belts and check pulleys and tensioners for wear and belt alignment. 3.F.11

12 Verify operation of instrument panel gauges and warning/indicator lights, and reset maintenance indicators. 3.F.12

13 Inspect interior and exterior lamps and sockets, including headlights and auxiliary light such as fog and driving lights and replace as needed. 3.F.13

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14 Verify windshield wiper and washer operation and replace wiper blades as needed. 3.F.14

G The student applies the technical knowledge and skills related to heating and air conditioning (A/C) in simulated or actual work situations. The student is expected to: 3.G

1 Identify refrigerant type and the safety and environmental concerns related to handling and storage. 3.G.1

2 Inspect engine cooling and heater systems hoses. 3.G.2

3 Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets. 3.G.3

4 Inspect A/C condenser for airflow restrictions. 3.G.4

5 Identify hybrid vehicle A/C system electrical circuits and the service/safety precautions. 3.G.5

6 Connect a manifold gauge set to perform basic static and running pressure readings; compare to manufacturer specifications. 3.G.6

7 Measure A/C outlet air temperature under specified conditions and compare to manufacturer specifications. 3.G.7

H The student applies the technical knowledge and skills related to manual and automatic drive train and axles in simulated or actual work situations. The student is expected to: 3.H

1 Identify the different fluid types used in both an automatic and manual transmission/transaxle. 3.H.1

2 Identify the fluid types and capacity required by application using service information. 3.H.2

3 Check fluid level in a transmission or a transaxle equipped with a dipstick. 3.H.3

4 Check fluid level in a transmission or a transaxle not equipped with a dipstick, 3.H.4

5 Check fluid condition and inspect for leaks. 3.H.5

6 Drain and replace fluid and filter or filters in an automatic transmission/transaxle. 3.H.6

7 Drain and replace fluid in a manual transmission/transaxle. 3.H.7

8 Inspect power train mounts. 3.H.8

9 Inspect and service transmission/transaxle external cooler and lines for leaks, restrictions, or damage. 3.H.9

10 Inspect, adjust, or replace shift linkage/cables; verify manual range selector operation per service information. 3.H.10

11 Verify operation of transmission range (neutral safety) and back-up lamp circuits. 3.H.11

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12 Use service information to retrieve and record transmission/transaxle (TCM/PCM) diagnostic trouble codes and related freeze-frame data; clear codes as applicable. 3.H.12

I The student applies the technical knowledge and skills related to engine performance in simulated or actual work situations. The student is expected to: 3.I

1 Inspect and explain the electrical/electronic components, sensors and circuits on an on board diagnostics (OBD) controlled engine. 3.I.1

2 Perform engine absolute manifold pressure tests such as vacuum or boost. 3.I.2

3 Verify engine operating temperature. 3.I.3

4 Remove and replace spark plugs and inspect secondary ignition components for wear and damage. 3.I.4

5 Describe the importance of operating all OBD II monitors for repair verification. 3.I.5

6 Retrieve and record diagnostic trouble codes, OBD II monitor status, and freeze frame data and clear codes when applicable. 3.I.6

7 Inspect, service, or replace air filters, filter housings, and intake duct work. 3.I.7

8 Replace fuel filter or filters. 3.I.8

9 Inspect integrity of the exhaust manifolds, exhaust pipes, mufflers, catalytic converters, resonators, tail pipes, and heat shields. 3.I.9

10 Inspect, test, and service positive crankcase ventilation (PCV) system and its components such as the filter/breather cap, valve, tubes, orifices, and hoses. 3.I.10

11 Measure and compare fuel pressure and fuel pump volume to manufacturer specifications. 3.I.11

12 Use a scan tool to view and interpret live data (e.g., STFT/LTFT, O_2 sensor output, MAF/MAP) to identify simple faults. 3.I.12

13 Check for engine vacuum leaks using approved methods and service information. 3.I.13

J The student applies the technical knowledge and skills related to suspension systems and simulated or actual work situations. The student is expected to: 3.J

1 Identify and interpret tire sidewall data information such as Department of Transportation (DOT) production date information, tire load capacity, inflation pressures, sizing description, and speed rating. 3.J.1

2 Demonstrate tire tread depth measuring procedures using industry standards such as common tread depth gauges. 3.J.2

3 Demonstrate tire and wheel balance such as static and dynamic balance, and proper wheel weight selection. 3.J.3

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Demonstrate tire and wheel measurements such as radial and lateral run-out in tire and wheel assembly. 3.J.4

5 Inspect steering linkage components and mounts such as inner and outer tie-rod ends, pitman arm, idler arm, inner rack and pinion ends, rack and pinion mounts, upper and lower ball joints, power steering pump, and hoses for leaks. 3.J.5

6 Remove, clean, inspect, and repack wheel bearings, properly install wheel seals, and adjust wheel bearing pre-load. 3.J.6

7 Inspect shock absorbers and McPherson struts for leakage and performance using jounce and rebound tests. 3.J.7

8 Demonstrate wheel stud replacement and installation of wheel and tire assembly with proper torquing procedure. 3.J.8

9 Identify and test the Tire Pressure Monitoring Systems (TPMS), both the direct and indirect, for proper operation. 3.J.9

10 Dismount and mount a tire on a wheel and reinstall the assembly, including torquing the lug nuts. 3.J.10

11 Rotate tires according to manufacturer recommendations. 3.J.11

K The student develops technology skills. The student is expected to: 3.K

1 Use technology as a tool to research, organize, evaluate, and communicate information. 3.K.1

2 Use digital technologies (computers, PDAs, media players, GPSs, etc.); communication/ networking tools, and social networks appropriately to access, manage; integrate, evaluate, and create information to successfully function in a knowledge economy. 3.K.2

3 Demonstrate using current and new technologies specific to the program of study, course; and/or industry. 3.K.3

4 Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies. 3.K.4