# Scope & Sequence

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| Course Name: Automotive Technology I: Maintenance and Light Repair **TSDS PEIMS Code:** 13039600 | | | **Course Credit:** 2.0  **Course Requirements:** Recommended Grade Placement: 9 – 12.  **Prerequisites:** None.  **Recommended Prerequisites:** Automotive Basics. |
| **Course Description:** 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. | | | |
| **NOTE:** This is a suggested scope and sequence for the course content. This content will work with any textbook or instructional materials. If locally adapted, make sure all TEKS are covered. | | | |
| **Total Number of Periods**  **Total Number of Minutes**  **Total Number of Hours** | 350 Periods  15,750 Minutes  262.50 Hours\* | \*Schedule calculations based on 175/180 calendar days. For 0.5 credit courses, schedule is calculated out of 88/90 days. Scope and sequence allows additional time for guest speakers, student presentations, field trips, remediation, extended learning activities, etc. | |
| **Unit Number, Title, and Brief Description** | **# of Class Periods\***  (assumes 45-minute periods)  Total minutes per unit | **TEKS Covered**  **130.449. (c) Knowledge and skills** | |
| **Unit 1: Professional Standards and Career Exploration**  Students will expand their knowledge base and interest in careers and entrepreneurship opportunities in the automotive technology industry. Students will discuss and demonstrate the principles of group participation and teamwork and effective and appropriate communication in this and in all units as they develop personal and career goals and increase their interpersonal skills. Students will explore and discuss employers’ expectations and industry-recognized certification opportunities and requirements as they continue to develop their plans, goals, and objectives for future career and educational opportunities. | 10 periods  450 minutes | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:  (B) identify career and employment opportunities, including entrepreneurship opportunities, and internships and industry-recognized certification requirements for the field of automotive technology;  (C) demonstrate the principles of group participation, team concept, and leadership related to citizenship and career preparation;  (D) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in the automotive technology industry;  (E) discuss certification opportunities;  (G) identify employers' expectations and appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills; and  (H) develop personal goals, objectives, and strategies as part of a plan for future career and educational opportunities.  (2) The student demonstrates academic skills related to the requirements of automotive technology. The student is expected to:  (A) demonstrate effective oral communication skills with individuals from various cultures such as fellow students, coworkers, and customers. | |
| **Unit 2: Health and Safety**  Students will discuss and identify employers’ expectations regarding safe and appropriate work habits, ethical conduct, and legal responsibilities in the workplace. Students will participate as a class and/or in small groups to model, present, and discuss health and safety scenarios and safety equipment in the workplace as well as response plans to potential emergency situations. Students will examine and discuss safety data sheets, and observe and discuss the proper handling and disposal of environmentally hazardous materials used in servicing vehicles. Students will observe, discuss, and demonstrate the proper use of hand and power tools and other equipment commonly employed in the maintenance and repair of vehicles. | 30 periods  1,350 minutes | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:  (A) demonstrate knowledge of the technical knowledge and skills related to health and safety in the workplace such as safety glasses and other personal protective equipment (PPE) and safety data sheets (SDS);  (C) demonstrate the principles of group participation, team concept, and leadership related to citizenship and career preparation;  (D) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in the automotive technology industry;  (F) discuss response plans to emergency situations; and  (G) identify employers' expectations and appropriate work habits, ethical conduct, legal responsibilities, and good citizenship skills.  (4) The student demonstrates the functions and applications of the tools, equipment, technologies, and materials used in automotive technology. The student is expected to:  (A) demonstrate the proper use of hand and power tools and equipment commonly employed in the maintenance and repair of vehicles; and  (B) discuss the proper handling and disposal of environmentally hazardous materials used in servicing vehicles. | |
| **Unit 3: Academic and Communication Skills in Automotive Technology**  Students will explore, discuss, and demonstrate the academic and communication skills required for a successful career in automotive technology. Students will be given multiple opportunities to demonstrate and apply relevant problem-solving, communication, and academic skills in-context as they demonstrate occupational tasks such as documenting work/repair orders and locating, reading, and interpreting service repair information such as schematics, charts, diagrams, graphs, parts catalogs, and technical bulletins. Students will discuss Pascal's Theory of Hydraulics as it relates to the brake system, and Ohm's Law as it relates to the principles of electricity and the electronics systems in vehicles, and predict what other mathematic/academic skills will be necessary for a successful career in automotive technology. | 30 periods  1,350 minutes | (1) The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:  (D) apply competencies related to resources, information, interpersonal skills, problem solving, critical thinking, and systems of operation in the automotive technology industry.  (2) The student demonstrates academic skills related to the requirements of automotive technology. The student is expected to:  (A) demonstrate effective oral communication skills with individuals from various cultures such as fellow students, coworkers, and customers;  (B) 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; and  (C) 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) The student demonstrates technical knowledge and skills related to the manufacturer preventative maintenance schedule. The student is expected to:  (D) locate, read, and interpret service repair information such as schematics, charts, diagrams, graphs, parts catalogs, and technical bulletins.  (5) The student applies the technical knowledge and skills related to brakes in simulated or actual work situations. The student is expected to:  (A) explain Pascal's Theory of Hydraulics as it relates to the brake system.  (6) The student applies the technical knowledge and skills related to electrical systems in simulated or actual work situations. The student is expected to:  (A) demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity as defined by Ohm's Law. | |
| **Unit 4: Preventative Maintenance**  Students will be given multiple opportunities to demonstrate their knowledge of preventive maintenance schedules, inspections, repairs, and replacements with hands-on activities and demonstrations and in simulated or actual automotive technology work task situations. Students will successfully explain and perform preventative maintenance activities as well as explain and safely perform a jump-start of a vehicle according to manufacturer recommended procedures. Students will also describe the function of the automotive chassis components, including braking, steering, transmission, drive train, and suspension systems, locate, read, and interpret service repair information, and use published specifications to diagnose component wear and determine necessary repairs. | 45 periods  2,025 minutes | (3) The student demonstrates technical knowledge and skills related to the manufacturer preventative maintenance schedule. The student is expected to:  (A) locate the manufacturer recommended preventative maintenance schedule;  (B) perform a preventative maintenance inspection of vehicle systems, including engine, fuel, lubrication, cooling, electrical, suspension, drive train, and air-conditioning systems;  (C) describe the function of the automotive chassis components, including braking, steering, transmission, drive train, and suspension systems;  (D) locate, read, and interpret service repair information such as schematics, charts, diagrams, graphs, parts catalogs, and technical bulletins;  (E) use published specifications to diagnose component wear and determine necessary repairs;  (F) identify the appropriate oil viscosity and capacity;  (G) verify operation of the instrument panel engine warning indicators;  (H) inspect engine assembly and document findings of fuel, oil, coolant, and other leaks;  (I) perform common fastener and thread repair, including removing broken bolt, restoring internal and external threads, and repairing internal threads with thread insert;  (J) inspect, replace, and adjust drive belts, tensioners, and pulleys;  (K) perform engine oil and filter change; and  (L) 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. | |
| **Unit 5: Brakes**  Students will be given multiple hands-on opportunities to demonstrate their technical knowledge of brake systems, parts, and components as well as their understanding of Pascal’s Theory of Hydraulics as it relates to the brake system. Students will apply and explain their technical knowledge and skills in activities, discussions, repairs, re-assemblies, and inspections and/or in simulated or actual automotive technology work task situations, as well as have opportunities to safely learn and demonstrate the proper use of tools, equipment, and materials related to brake systems and servicing. | 40 periods  1,800 minutes | (5) The student applies the technical knowledge and skills related to brakes in simulated or actual work situations. The student is expected to:  (A) explain Pascal's Theory of Hydraulics as it relates to the brake system;  (B) inspect brake system components, including master cylinder, brake lines, wheel cylinders, calipers, and flexible hoses and fittings, for external leaks and proper operation;  (C) inspect, measure, and refinish brake drum diameter to manufacturer specifications;  (D) remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates;  (E) lubricate, reassemble, and pre-adjust brake shoes and parking brake;  (F) remove, inspect for damage or wear, clean, lubricate, and reassemble pads and retaining hardware, caliper assembly, and mounting components such as slides and pins for proper operation;  (G) refinish a rotor on and off a vehicle and measure final rotor thickness with manufacturer specifications;  (H) retract and re-adjust caliper piston on an integral parking brake system;  (I) check brake pedal travel with, and without, engine running to verify proper power booster operation;  (J) check brake pedal travel with, and without, engine running to verify proper power booster operation;  (K) check vacuum supply from a manifold or auxiliary pump to vacuum-type brake power booster; and  (L) describe the operation of a regenerative braking system. | |
| **Unit 6: Electronics**  Students will be given multiple opportunities to demonstrate their knowledge of electrical components, equipment, circuits, and electronic systems as well as Ohm’s Law with hands-on activities, demonstrations, presentations, discussions, and inspections. Some or all of the opportunities will be given in simulated or actual automotive technology work task situations. Students will also trace circuits, perform tests, inspections, and repairs, and demonstrate use of a digital multimeter as well as demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits. | 40 periods  1,800 minutes | (6) The student applies the technical knowledge and skills related to electrical systems in simulated or actual work situations. The student is expected to:  (A) demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity as defined by Ohm's Law;  (B) demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop, current flow, resistance, and ground circuits;  (C) use wiring diagrams to trace electrical/electronic circuits;  (D) demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits;  (E) confirm proper battery capacity for vehicle application and perform battery capacity test;  (F) perform battery state-of-charge test;  (G) inspect and clean the battery, fill battery cells, and check battery cables, connectors, clamps, and hold-downs;  (H) perform starter current draw test;  (I) inspect and test fusible links, circuit breakers, fuses, and relays;  (J) perform charging system output test;  (K) inspect, adjust, or replace generator/alternator drive belts and check pulleys and tensioners for wear and belt alignment;  (L) verify operation of instrument panel gauges and warning/indicator lights, and reset maintenance indicators;  (M) inspect interior and exterior lamps and sockets, including headlights and auxiliary light such as fog and driving lights and replace as needed; and  (N) verify windshield wiper and washer operation and replace wiper blades as needed. | |
| **Unit 7: Heating and Air Conditioning**  Students will be given multiple opportunities to safely demonstrate the proper use of tools, equipment, and refrigerant materials related to heating and air conditioning in hands-on activities, presentations, discussions, and inspections in simulated or actual automotive technology work situations. Students will apply their technical knowledge and skills to identify air-conditioning, heating, and accessory system components and perform inspections. Students will demonstrate their understanding of hybrid vehicle A/C system electrical circuits and the associated service/safety precautions. | 35 periods  1,575 minutes | (4) The student demonstrates the functions and applications of the tools, equipment, technologies, and materials used in automotive technology. The student is expected to:  (A) demonstrate the proper use of hand and power tools and equipment commonly employed in the maintenance and repair of vehicles.  (7) 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:  (A) identify refrigerant type and the safety and environmental concerns related to handling and storage;  (B) inspect engine cooling and heater systems hoses;  (C) inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets;  (D) inspect A/C condenser for airflow restrictions; and  (E) identify hybrid vehicle A/C system electrical circuits and the service/safety precautions. | |
| **Unit 8: Drive Trains**  Students will be given multiple opportunities to learn and demonstrate the technical knowledge, skills, and procedures for inspecting and servicing manual and automatic drive train and axles in simulated and/or actual automotive technology work situations. Students will check and identify all appropriate fluids, capacities, and conditions, inspect for leaks, and drain and replace fluids and filters as assigned. Students will continue to be given multiple opportunities to safely demonstrate the proper use of tools, equipment, and materials in hands-on activities, presentations, discussions, repairs, and inspections in simulated or actual automotive technology work situations. | 40 periods  1,800 minutes | (8) 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:  (A) identify the different fluid types used in both an automatic and manual transmission/transaxle;  (B) identify the fluid types and capacity required by application using service information;  (C) check fluid level in a transmission or a transaxle equipped with a dip-stick;  (D) check fluid level in a transmission or a transaxle not equipped with a dip-stick;  (E) check fluid condition and inspect for leaks;  (F) drain and replace fluid and filter or filters in an automatic transmission/transaxle;  (G) drain and replace fluid in an manual transmission/transaxle; and  (H) inspect power train mounts. | |
| **Unit 9: Engine Performance**  Students will be given multiple opportunities to demonstrate their technical knowledge and skills related to engines and engine performance, components, sensors, and systems with hands-on activities, presentations, discussions, and inspections in simulated or actual automotive technology work situations. Students will safely perform tests and inspections as well as repairs/replacements as indicated and/or assigned, and be given multiple opportunities to safely demonstrate the proper use of tools, equipment, and other materials in hands-on in simulated or actual automotive technology work task situations. | 40 periods  1,800 minutes | (9) The student applies the technical knowledge and skills related to engine performance in simulated or actual work situations. The student is expected to:  (A) inspect and explain the electrical/electronic components, sensors and circuits on an on board diagnostics (OBD) controlled engine;  (B) perform engine absolute manifold pressure tests such as vacuum or boost;  (C) verify engine operating temperature;  (D) remove and replace spark plugs and inspect secondary ignition components for wear and damage;  (E) describe the importance of operating all OBD II monitors for repair verification;  (F) retrieve and record diagnostic trouble codes, OBD II monitor status, and freeze frame data and clear codes when applicable;  (G) inspect, service, or replace air filters, filter housings, and intake duct work;  (H) replace fuel filter or filters;  (I) inspect integrity of the exhaust manifolds, exhaust pipes, mufflers, catalytic converters, resonators, tail pipes, and heat shields; and  (J) inspect, test, and service positive crankcase ventilation (PCV) system and its components such as the filter/breather cap, valve, tubes, orifices, and hoses. | |
| **Unit 10: Suspension Systems and Tires**  Students will be given multiple opportunities to demonstrate and apply their technical knowledge and skills related to suspension systems and tires with hands-on activities, presentations, discussions, and inspections in simulated or actual automotive technology work task situations. Students will identify and interpret tire sidewall data, demonstrate tire tread depth measuring procedures, demonstrate tire and wheel balance and other measurements, identify and test the Tire Pressure Monitoring Systems, dismount and mount a tire on a wheel and reinstall the assembly, and rotate tires according to manufacturer recommendations. Students will also perform all assigned inspections, including checking for leaks and/or wear, and demonstrate the safe and proper use of tools, equipment, and other materials. | 40 periods  1,800 minutes | (10) The student applies the technical knowledge and skills related to suspension systems and simulated or actual work situations. The student is expected to:  (A) 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;  (B) demonstrate tire tread depth measuring procedures using industry standards such as common tread depth gauges;  (C) demonstrate tire and wheel balance such as static and dynamic balance, and proper wheel weight selection;  (D) demonstrate tire and wheel measurements such as radial and lateral run-out in tire and wheel assembly;  (E) 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;  (F) remove, clean, inspect, and repack wheel bearings, properly install wheel seals, and adjust wheel bearing pre-load;  (G) inspect shock absorbers and McPherson struts for leakage and performance using jounce and rebound tests;  (H) demonstrate wheel stud replacement and installation of wheel and tire assembly with proper torqueing procedure;  (I) identify and test the Tire Pressure Monitoring Systems (TPMS), both the direct and indirect, for proper operation;  (J) dismount and mount a tire on a wheel and reinstall the assembly, including torqueing the lug nuts; and  (K) rotate tires according to manufacturer recommendations. | |