SCOPE AND SEQUENCE

Course Name: Automotive Technology I

Instructor: Chuck Brighenti

Career Cluster: Supply Chain & Transportation

Sub Cluster:Maintenance and Repair

HS Course Credits: 1 science and 2 electives per year

Fast Forward Optional Credits: n/a

Tier 2 Credentials: ASE Entry Level Certification (9 areas available); Tire Industry Certification (TIA).

Tier 1 Credentials: SP/2 Safety Certification, Lift it Right

CTSO/Enrichment: Skills USA, Heritage Auto Group Automotive Challenge

Recommended preparation for success in this course: Algebra I or Geometry; Intro to STEM; Mechanical Science.

Tagline: Drive your future!

Student appeal: In this course, you'll dive into the daily workings of a real auto repair shop, dealing with actual customers. Alongside classroom sessions focusing on different automotive systems, you'll explore topics like tools and equipment, maintenance, engines, electronics, steering, brakes, and more. Get ready for theory lessons, hands-on lab training, and even computer-based learning. Plus, qualified students can apply for a chance to gain real-world experience through a local work placement. Ready to roll up your sleeves and get started?

Course Description: This 2-year half-day program offers students the chance to experience the day-to-day operations of a fully functional auto repair shop, complete with real customers and real-world challenges. Guided by industry professionals, students will combine hands-on training with classroom learning to master the essential systems of modern automotive technology.

Through engaging theory lectures, student-driven research, computer-based learning tools, and lab exercises, you'll explore a wide range of topics, including:

- Safety, tools, and equipment
- Preventative maintenance
- Tires and light service
- Steering and suspension
- Brake systems
- Fasteners and Measurements
- Automotive specific MIG welding

Students who go on to Auto II, and qualify, will also have the opportunity to participate in a cooperative work experience with local businesses, gaining valuable real-world experience and building connections in the industry.

Whether you see yourself as a service technician, a custom builder, or a future shop owner, a foundation in automotive technology opens the door to a wide range of rewarding careers.

Proficiencies/Learning Targets:

LT1: Shop, Tool, and Industry Safety (Equipment): I can identify and safely use common shop tools and equipment.

LT2: Shop, Tool, and Industry Safety (Disposal / PPE): I can identify shop safety protocols, including PPE, proper automotive fluid and part disposal.

LT3: Industry Tools (Automotive Tools): I can select the correct tool for the task at hand and use that tool effectively.

LT4: Industry Tools (Torch / Welder): I can safely use an acetylene torch, inductance heater, and MIG welder to cut, heat, and bond metal.

LT5: General Vehicle Maintenance: I can find all necessary service information relating to, and perform, maintenance service on any vehicle following correct procedures, torque specification, and fluid specification.

LT6: General Vehicle Maintenance: I can find all necessary information relating to, and perform, a multi point inspection on any vehicle following correct procedures.

LT7: General Vehicle Maintenance (Tire Service): I can find all necessary information relating to, and perform, a Tire Change service on any vehicle following correct procedures, torque specification, and Tire Pressure specs

LT8: General Vehicle Maintenance (TPMS Service): I can explain to a customer the Tire Pressure Monitoring system, diagnose issues with sensors, and create replacement sensors.

LT9: General Vehicle Maintenance (Tire Repair): I can diagnose, recommend action, and repair (if applicable) tire damage/wear to industry standards.

LT10: Brake Hydraulic: I can understand and diagnose brake hydraulic systems, including application of Pascals Law, with a variety of customer concerns.

LT11: Brakes Disc: I can diagnose and service disc brakes with a variety of customer concerns.

LT12: Brakes Drum: I can diagnose and service drum brakes with a variety of customer concerns

LT13: Brake Specs: I can use technology to gather brake measurements and compare them to spec to develop informed repair procedures.

LT14: Brake Assist: I can identify and describe hydroboost vs vacuum boost brake systems inspect related components.

LT15: Brake Related Systems: I can identify, diagnose and service different parkings brake and bearing assemblies.

LT16: Brake ABS: I can explain the components of the ABS system and use the scan tool to diagnose ABS operation.

LT17: Steering: I can identify different power steering systems and diagnose common issues and develop repair strategies.

LT18: Suspension: I can identify different suspension systems and components and diagnose common issues and develop repair strategies.

LT19: Wheel Alignment: I can explain alignment angles and their effects on tire wear and handling and perform a pre-alignment inspections.

Standards: Standards are aligned with Vermont's CTE Automotive Technology, Diesel Technology, Auto Body Collision Critical Proficiencies Anchor Standards (VT), which derive from and are aligned with the Common Career Technical Core Standards for Transportation, Distribution & Logistics as well as with Automotive Service Excellence (ASE) Automobile Program Standards.

Additional standards alignment includes:

PAHCC Habits of Work: Safety, Work Ethic, Reliability, People Skills

PAHCC Transferable Skills: Creative and practical problem solving; Inquiry; Informed and Integrated Thinking.

CCTC - Career Ready Practices

Unit and Essential Question(s)	Estimated # of Classes Periods *(assumes 120-minute classes)*	Learning Targets
Unit 1: Shop, Tool, and Industry Safety **IRC**: SP2.ORG, Lift it Right Certification **Essential Questions:** ● *How can you ensure the safe and legal disposal of shop by-products, including parts and fluids, while adhering to environmental regulations?* ● *What are the key safety precautions and emergency procedures you should follow when working with shop tools, equipment, and hazardous materials, and how do they align with local, state, and federal regulations?*	15 Classes	**LT1: Shop, Tool, and Industry Safety (Equipment):** I can identify and safely use common shop tools and equipment. **LT2: Shop, Tool, and Industry Safety (Disposal / PPE):** I can identify shop safety protocols, including PPE, proper automotive fluid and part disposal. **Indicators/Tasks:** 1. Identify and explain laws and workplace policies. 2. Describe personal and environmental safety practices associated with clothing and proper Personal Protection Equipment (PPE); hand tools; power equipment; proper ventilation; and the handling, storage, and disposal of chemicals/materials in accordance with local, state, and federal safety and environmental regulations. 3. Identify vehicle system precautions and/or inspections to include but not limited to Supplemental Restraint System (SRS) Inspection, Advanced Driver Assistance Systems (ADAS), hybrid/electric/alternative fuel vehicles, locations and recommended procedures before inspecting or replacing components.

Unit 2: Industry Tools: (Welding, Cutting, Automotive Specialty Tools, etc) **Essential Questions:** ● *How can understanding the thermal properties of metal help in removing rusted fasteners, and what tools can be used to achieve this effectively?* ● *What are the key considerations for safely using industry tools like an acetylene torch, MIG welder, or inductance heater, and how can they be applied in vehicle maintenance and repairs?*	15 Classes	**LT3: Industry Tools (Automotive Tools):** I can select the correct tool for the task at hand and use that tool effectively. **LT4: Industry Tools (Torch / Welder):** I can safely use an acetylene torch, inductance heater, and MIG welder to cut, heat, and bond metal. **Indicators/Tasks** 1. Identify vehicle construction and parts. 2. Identify and utilize appropriate tools, materials, and equipment. 3. Demonstrate proper use of precision measuring tools.
Unit 3: General Vehicle Maintenance Part 1: General Vehicle Maintenance & Inspection Part 2: Wheels and Tires **IRC:** Tire Industry Association Certification **Essential Questions:** ● *How does understanding manufacturer specifications and service history contribute to ensuring proper maintenance and*	60 Classes	**LT5: General Vehicle Maintenance:** I can find all necessary service information relating to, and perform, maintenance service on any vehicle following correct procedures, torque specification, and fluid specification. **LT6: General Vehicle Maintenance:** I can find all necessary information relating to, and perform, a multi point inspection on any vehicle following correct procedures. **Indicators/Tasks** 1. Research vehicle service information such as fluid type, internal combustion engine operation, vehicle service history, service precautions, technical service bulletins, and recalls including vehicles equipped with advanced driver assistance systems (ADAS). 2. Verify operation of the instrument panel engine warning indicators.

operation of a vehicle's engine, fluid systems, and associated components? ● *How do I determine and perform scheduled maintenance across a variety of vehicles?* ● *How do different tire pressure monitoring systems (TPMS) function, and what steps should be taken to ensure proper tire and wheel maintenance and repair, including balancing, alignment, and sensor calibration?*		3. Inspect engine assembly for fuel, oil, coolant, and other leaks 4. Identify service precautions related to service of the internal combustion engine of a hybrid electric vehicle 5. Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required. 6. Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment 7. Inspect and test coolant; drain and recover coolant; flush and/or refill cooling system; use proper fluid type per manufacturer specification; bleed air as required. **LT7: General Vehicle Maintenance (Tire Service):** I can find all necessary information relating to, and perform, a Tire Change service on any vehicle following correct procedures, torque specification, and Tire Pressure specs **LT8: General Vehicle Maintenance (TPMS Service):** I can explain to a customer the Tire Pressure Monitoring system, diagnose issues with sensors, and create replacement sensors. **LT9: General Vehicle Maintenance (Tire Repair):** I can diagnose, recommend action, and repair (if applicable) tire damage/wear to industry standards. **Indicators/Tasks:** 1. Inspect tire condition/age; identify tire wear patterns; check for correct tire size, application (service-class, load, and speed ratings), and air pressure as listed on the tire information placard/label 2. Rotate tires according to manufacturer’s recommendations including vehicles equipped with tire pressure monitoring systems (TPMS). 3. Dismount, inspect, and remount tire on wheel (with/without TPMS); balance wheel and tire assembly.

		4. Inspect tire and wheel assembly for air loss; determine needed action. 5. Repair tire following tire manufacturer approved procedure 6. Identify indirect and direct tire pressure monitoring systems (TPMS); calibrate/relearn system; verify operation of instrument panel lamps. 7. Demonstrate knowledge of steps required to remove and replace sensors (per OEM/sensor manufacturer) in a tire pressure monitoring system (TPMS). 8. Perform Road Force balance/match mounting.
Unit 4: Brakes ***Hydraulic System:*** ● *How does Pascal's law apply to the operation of hydraulic brake systems, and why is it crucial for their function?* ***Disc Brakes:*** ● *What are the key steps and considerations in properly removing, inspecting, and reinstalling brake pads, rotors, and calipers on a disc brake system?* ***Drum Brakes:*** ● *What are the key steps and considerations in properly removing, inspecting, and reinstalling brake shoes, drums, and wheel cylinders on a drum brake system?*	45 classes	**LT10: Brake Hydraulic**: I can understand and diagnose brake hydraulic systems, including application of Pascals Law, with a variety of customer concerns. **Indicators/Tasks:** 1. Demonstrate understanding of hydraulic principles (Pascal's law). 2. Describe proper brake pedal height, travel, and feel 3. Check the master cylinder for proper operation. 4. Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings/supports 5. Select, handle, store, and fill brake fluids to proper level; use proper fluid type per manufacturer specification. 6. Identify components of hydraulic brake warning light system 7. Bleed and/or replace fluid in the brake system. 8. Test brake fluid for contamination **LT11: Brakes Disc:** I can diagnose and service disc brakes with a variety of customer concerns. **Indicators/Tasks:**

Power-Assist Units: ● *How do power brake assist systems (vacuum, hydraulic, electric) enhance braking performance, and what are the primary inspection points to ensure their proper operation?* ***Electronic Brake Control Systems (ABS, TCS, ESC):*** ● *How do electronic brake control systems such as ABS, TCS, and ESC contribute to vehicle safety, and what are the specific functions of each system in preventing skidding and maintaining vehicle stability?*		1. Remove and clean caliper assembly; inspect for leaks and damage, and wear. 2. Inspect caliper mounting and slides/pins for proper operation, wear, and damage. 3. Remove, inspect, and/or replace brake pads and retaining hardware. 4. Lubricate and reinstall caliper, brake pads, and related hardware; seat brake pads against rotor; inspect for leaks. 5. Clean and inspect rotor and mounting surface, measure rotor thickness, thickness variation, and lateral runout. 6. Remove and reinstall/replace rotor. 7. ProCut Brake Lathe Training 8. Extract and re-adjust the caliper piston on an integrated parking brake system. 9. Describe the importance of operating vehicles to burnish/break-in replacement brake pads according to manufacturer's recommendation. **LT12: Brakes Drum:** I can diagnose and service drum brakes with a variety of customer concerns **Indicators/Tasks:** 1. Remove, clean, and inspect brake drum; measure brake drum diameter; determine serviceability. 2. Refinish brake drum and measure final drum diameter; compare with specification. 3. Remove, clean, inspect, and/or replace brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.

		4. Inspect wheel cylinders for leaks and proper operation; remove and replace as needed. 5. Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings; perform final checks and adjustments. **LT13: Brake Specs:** I can use technology to gather brake measurements and compare them to spec to develop informed repair procedures. **Indicators/Tasks:** 1. Understand precision measuring tools as they pertain to brake service (micrometers, dial indicator, drum micrometer). **LT14: Brake Assist:** I can identify and describe hydroboost vs vacuum boost brake systems inspect related components. **Indicators/Tasks** 1. Check brake pedal travel with and without the engine running to verify proper power booster operation. 2. Identify components of the brake power assist system (vacuum/ hydraulic/electric). 3. Inspect vacuum-type power booster unit for leaks; inspect the check valve for proper operation; check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster to determine needed action. 4. Inspect and test hydraulically assisted power brake system for leaks and proper operation; determine needed action.

		LT15: Brake Related Systems: I can identify, diagnose and service different parkings brake and bearing assemblies. **Indicators/Tasks:** 1. Remove, inspect, and replace, wheel bearings/hub assemblies 2. Check parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and/or replace as needed. 3. Check parking brake operation (including electric parking brakes); check parking brake indicator light system operation. 4. Check the operation of the brake stop light system. 5. Inspect and replace wheel studs. **LT16: Brake ABS:** I can explain the components of the ABS system and use the scan tool to diagnose ABS operation. **Indicators/Tasks:** 1. Identify electronic brake control system components and describe function (ABS, TCS, ESC). 2. Describe the operation of a regenerative braking system.
Unit 5: Steering ***General:*** ● *How does accessing and interpreting vehicle service information, including technical service bulletins and recalls,*	15 classes	**LT17: Steering:** I can identify different power steering systems and diagnose common issues and develop repair strategies. **Indicators/Tasks:** 1. Search vehicle service information such as fluid type, vehicle service history, service precautions, technical service bulletins (TSBs). 2. Identify suspension and steering system components and configurations.

contribute to effective vehicle maintenance and repair practices? ***Steering Systems:*** ● *What are the critical inspection and maintenance procedures necessary to ensure the optimal performance and safety of a vehicle's power steering system, including components like the rack and pinion steering gear, power steering pump, hoses, and fluid?*		3. Verify operation of SRS and indicator lamp operation. 4. Identify and inspect rack and pinion steering gear tie rod ends (sockets) and bellows boots. 5. Inspect power steering fluid level and condition, and use proper fluid type per manufacturer specification. 6. Inspect for power steering fluid leakage. 7. Remove, inspect, replace, and/or adjust power steering pump drive belt. 8. Inspect power steering hoses and fittings. 9. Identify and inspect pitman arm, relay (centrelink/intermediate) rod, idler arm, mountings, and steering linkage damper 10. Inspect tie rod ends (sockets), tie rod sleeves, and clamps (non-rack and pinion). 11. Identify electric power steering systems and their related components.
Unit 6: Suspension ***Suspension Systems:*** ● *How do the various components of a vehicle's suspension system, such as control arms, ball joints, and coil springs, contribute to ride quality, handling, and overall vehicle safety?* ***Related Suspension and Steering Service:*** ● *What are the key functions and benefits of electronically controlled suspension and steering systems, including how they enhance*	15 classes	**LT18: Steering & Suspension:** I can identify different suspension systems and components and diagnose common issues and develop repair strategies. **Indicator and Tasks:** 1. Inspect upper and/or lower control arms, bushings, and shafts. 2. Inspect and replace rebound/jounce bumpers. 3. Inspect track bar, strut rods/radius arms, and related mounts and bushings. 4. Inspect upper and/or lower ball joints (with or without wear indicators 5. Inspect suspension system coil springs and spring insulators. 6. Inspect torsion bars and mounts 7. Inspect and/or replace front/rear stabilizer bar (sway bar) bushings, brackets, and links.

vehicle stability and comfort across different driving conditions?		8. Inspect, remove, and/or replace strut assembly, strut coil spring, insulators, and upper strut bearing mount. 9. Inspect components of suspension systems (Coil, Leaf, and Torsion). 10. Inspect components of electronically controlled suspension systems 11. Inspect, remove, and/or replace shock absorbers; inspect mounts and bushings. 12. Inspect front and rear wheel bearings. 13. Describe the function of electronically controlled suspension and steering systems and components, (i.e., active suspension and stability control).
Unit 7: Wheel Alignment ***Wheel Alignment:*** ● *How do the four-wheel alignment angles (camber, caster, and toe) affect both vehicle handling and tire wear, and why is it crucial to understand and adjust these angles during the alignment process?*	10 classes	**LT11: Wheel Alignment:** I can explain alignment angles and their effects on tire wear and handling and perform a pre-alignment inspections. **Indicators/Tasks:** 1. Perform pre-alignment inspection; measure vehicle ride height. 2. Describe four-wheel alignment angles (camber, caster, and toe) and effects on vehicle handling\tire wear.

Transferable Skills	Throughout	**Learning Targets:** ● TRANSFERABLE SKILL - CREATIVE AND PRACTICAL PROBLEM SOLVING: I analyze, evaluate, and synthesize new and old information from multiple sources to build on knowledge and imagination to envision next steps. I observe and evaluate situations in order to define problems. I flexibly examine new approaches and ideas. ● TRANSFERABLE SKILL - EXPRESSION (SPEAKING, LISTENING, READING, WRITING, NON-VERBAL): I adjust communication based on the audience, context, and purpose. I demonstrate clear and concise communication: active listening, oral, written, multimedia, and/or performance. I use a positive voice and body. ● TRANSFERABLE SKILL - PRINCIPLED: I act with integrity and honesty. I use technology efficiently and appropriately to obtain, analyze, cite and use information demonstrating responsible digital citizenship.