



Scope and Sequence Curriculum Outline

Career Program: Automotive Technology II

DOE Code: 5546

Career Cluster: Transportation

Recommended Grade Levels: 12

Prerequisites: Automotive Technology I

High School Credits: 3 per semester (6 total per school year)

Additional Information: Counts as a Directed Elective or Elective for the General, Core 40, Academic Honors and Technical Honors diplomas

Program Description: Automotive Services Technology II focuses on electrical systems and engine performance. Additional areas of study include manual transmissions and differentials, automatic transmissions, air conditioning, and engine repair. Mathematical skills will be reinforced through precision measuring activities and cost estimation/calculation activities. Scientific principles taught and reinforced in this course include the study of viscosity, friction, thermal expansion, and compound solutions. Written and oral skills are also emphasized to help students communicate with customers, other students, and instructors. This program is NATEF (National Automotive Technicians Education Foundation) certified. Upon completion of this program, students are prepared for entry-level employment in the automotive service industry. Students may also continue their education in 2 and 4-year degree programs at the postsecondary level.

Alignment: Indiana Department of Education Academic Standards Course Framework; ASE (National Institute for Automotive Service Excellence) student certification; NATEF (National Automotive Technicians Education Foundation) program accreditation standards; Ivy Tech Community College (dual credit agreement); and *Light Vehicle Online* text and student workbook (CDX), *PAC Fundamentals of Automotive Technology* (CDX), and *S/P2 Safety Training* (S/P2) curriculum materials

Companion Documents: WCC Automotive Technology II Program Syllabus; WCC High School Pathway Plan; WCC Program Description Guide

Curriculum Content Summary:

- Employability
- Knowledge/Understanding
- Diagnosis
- Repair

Content	Indiana DOE Standards	Knowledge & Skills <i>(based on ASE/NATEF)</i>	Example Activities	Time Frame	Evaluation / Certification
<p>DOMAIN Employability</p> <p>Core Standard I Students apply and adapt appropriate workplace behaviors and characteristics to prepare for automotive careers</p>	<p>ASTII-1.1 Demonstrate effective interpersonal skills</p> <p>ASTII-1.2 Develop leadership skills</p> <p>ASTII-1.3 Research, analyze, and use data for work assignments</p> <p>ASTII-1.4 Apply written communication skills</p> <p>ASTII-1.5 Demonstrate effective listening and speaking skills</p> <p>ASTII-1.6 Perform appropriate mathematical calculations correctly</p> <p>ASTII-1.7 Exhibit a responsible work ethic</p> <p>ASTII-1.8 Demonstrate accepted standards for ethical behavior</p> <p>ASTII-1.9 Establish a personal career goal and develop objectives for achieving the goal</p> <p>ASTII-1.10 Evaluate employment and career pathway opportunities related to established career interest(s)</p> <p>ASTII-1.11 Create a continuing education plan that identifies further education and training options</p> <p>ASTII-1.12 Develop skills needed to enter the workforce</p> <p>ASTII-1.13 Evaluate resources that keep workers current in the career field</p> <p>ASTII-1.14 Apply effective money management strategies</p> <p>ASTII-1.15 Identify tools and diagnostic equipment utilized in the service and repair of automotive electrical and electronic systems</p>	<ul style="list-style-type: none"> • Reports to work daily on time • Able to take directions and is motivated to accomplish the task at hand • Dresses appropriately and uses language and manners suitable for the workplace • Meets and maintains employment eligibility criteria, such as drug/alcohol-free status, clean driving record, etc. • Demonstrates honesty, integrity, and reliability • Works well with all customers and coworkers • Negotiates solutions to interpersonal and workplace conflicts • Follows directions • Communicates effectively with customers and coworkers • Reads and interprets workplace documents • Analyzes and resolves problems that arise in completing assigned tasks • Organizes and implements a productive plan of work • Uses scientific, technical, engineering, and mathematics principles and reasoning to accomplish assigned tasks • Identifies and addresses the needs of all customers, providing helpful, courteous, and knowledgeable service and advice as needed 	<ul style="list-style-type: none"> • Classroom activities • Written assignments • Training videos • Industry speakers • Postsecondary speakers • NTHS • SkillsUSA membership • Skill competitions • Student ambassadors • Field trips 	<p>9 weeks</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> • Maintenance & Light Repair (MLR) task sheets • Essential Skills Evaluation • Technical Skills Evaluation • Work Ethic Certification • Participation/lab work

Content	Indiana DOE Standards	Knowledge & Skills <i>(based on ASE/NATEF)</i>	Example Activities	Time Frame	Evaluation / Certification
<p>DOMAIN Knowledge/Understanding</p> <p>Core Standard 2 Students analyze vehicle electrical components and system operations to establish accurate diagnosis and repair procedures</p>	<p>ASTII-2.1 Allocate the appropriate resources for task completion</p> <p>ASTII-2.2 Read and interpret written materials</p> <p>ASTII-2.3 Demonstrate knowledge of vehicle electrical system</p> <p>ASTII-2.4 Explain safety procedures</p> <p>ASTII-2.5 Demonstrate safe shop practices while working with electrical systems and test Equipment</p> <p>ASTII-2.6 Identify tools and diagnostic equipment utilized in the service and repair of automotive electrical and electronic systems</p> <p>ASTII-2.7 Explain the basic laws of electricity</p> <p>ASTII-2.8 Define electrical circuit terminology and symbols</p> <p>ASTII-2.9 Identify electrical components in a simple electrical schematic and circuit</p> <p>ASTII-2.10 Calculate resistance, current, and voltage problems using Ohms Laws</p> <p>ASTII-2.11 Perform voltage, current, and resistance measurements using the proper measurement Devices</p> <p>ASTII-2.12 Calculate resistance, voltage, and current in series, parallel, and series-parallel electrical circuits</p> <p>ASTII-2.13 Study starting and charging system theory and basic circuits</p> <p>ASTII-2.14 Perform voltage drop testing on starting and charging circuits</p> <p>ASTII-2.15 Perform battery testing and diagnosis</p> <p>ASTII-2.16 Calculate resistance, current, and voltage problems using Ohms Laws</p>	<ul style="list-style-type: none"> • Research vehicle service information including vehicle service history, service precautions, and technical service bulletins • Demonstrate knowledge of electrical/electronic series, parallel, and series parallel circuits using principles of electricity (Ohm's Law) • Use wiring diagrams to trace electrical/electronic circuits • Demonstrate proper use of a digital multimeter (DMM) when measuring source voltage, voltage drop (including grounds), current flow, and resistance • Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits • Measure key-off battery drain (parasitic draw) • Inspect and test fusible links, circuit breakers, and fuses; determine necessary action • Repair and/or replace connectors, terminal ends, and wiring of electrical/electronic systems (including solder repair) • Identify electrical/electronic system components and configuration • Perform battery state-of-charge test; determine necessary action • Confirm proper battery capacity for vehicle application; perform battery capacity and load test; determine necessary action • Maintain or restore electronic memory functions • Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs • Perform slow/fast battery charge according to manufacturer's recommendations • Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply • Identify electrical/electronic modules, security systems, radios, and other accessories that require reinitialization or code entry after reconnecting vehicle battery • Perform starter current draw test; determine necessary action • Perform starter circuit voltage drop tests; determine necessary action • Remove and install starter in a vehicle 	<ul style="list-style-type: none"> • Classroom activities • Written assignments • Demonstration of brake lathe usage • Lab/shop work • Customer diagnosis and repair work 	<p>9 weeks</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> • Maintenance & Light Repair (MLR) task sheets • Practical evaluation of disc brake inspection • ASE certifications • SP2 certifications • Participation/lab work • Dual credit

		<ul style="list-style-type: none"> • Perform charging system output test; determine necessary action • Inspect, adjust, and/or replace generator (alternator) drive belts; check pulleys and tensioners for wear; check pulley and belt alignment • Inspect interior and exterior lamps and sockets including headlights and auxiliary lights (fog lights/driving lights); replace as needed • Disable and enable supplemental restraint system (SRS); verify indicator lamp operation • Remove and reinstall door panel • Verify operation of instrument panel gauges and warning/indicator lights; reset maintenance indicators • Verify windshield wiper and washer operation; replace wiper blades • Research vehicle service information, including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins • Identify heating, ventilation and air conditioning (HVAC) components and configuration • Inspect and replace A/C compressor drive belts, pulleys, and tensioners; visually inspect A/C components for signs of leaks; determine necessary action • Inspect A/C condenser for airflow restrictions; determine necessary action • Inspect engine cooling and heater systems hoses and pipes; determine necessary action • Inspect A/C-heater ducts, doors, hoses, cabin filters, and outlets; determine necessary action 			
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<p>DOMAIN Diagnosis</p> <p>Core Standard 3 Students analyze various vehicle system defects to determine necessary service</p>	<p>ASTI-3.1 Apply effective critical thinking, decision making, and problem-solving techniques</p> <p>ASTII-3.2 Perform Computerized Engine Diagnosis and Complete Repairs</p> <p>ASTII-3.3 Inspect and repair ignition system problems</p> <p>ASTII-3.4 Diagnose fuel, air induction, and exhaust systems</p> <p>ASTII-3.5 Troubleshoot, clean, and replace components of emission control systems</p>	<ul style="list-style-type: none"> • Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins • Verify operation of the instrument panel engine warning indicators • Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action • Install engine covers using gaskets, seals, and sealers as required • Perform common fastener and thread repair, to include: remove broken bolt, restore internal and external threads, and repair internal threads with thread insert • Identify components of the cylinder head and valve train • Perform cooling system pressure and dye tests to identify leaks; check coolant condition and level; inspect and test radiator, pressure cap, coolant recovery tank, heater core, and galley plugs; determine necessary action • Inspect, replace, and/or adjust drive belts, tensioners, and pulleys; check pulley and belt alignment • Remove, inspect, and replace thermostat and gasket/seal • Inspect and test coolant; drain and recover coolant; flush and refill cooling system; use proper fluid type per manufacturer specification; bleed air as required • Perform engine oil and filter change; use proper fluid type per manufacturer specification; reset maintenance reminder as required • Identify components of the lubrication and cooling systems • Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins • Check fluid level in a transmission or a transaxle equipped with a dip-stick • Check fluid level in a transmission or a transaxle not equipped with a dipstick • Identify drivetrain components and configuration • Inspect for leakage at external seals, gaskets, and bushings • Drain and replace fluid and filter(s); use proper fluid type per manufacturer specification 	<ul style="list-style-type: none"> • Classroom activities • Written assignments • Tire repair demonstration • Alignment demonstration • Lab/shop work • Student test drives • Customer diagnosis work 	<p>9 weeks</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> • Maintenance & Light Repair (MLR) task sheets • Steering and suspension component identification • Chapters 16, 20, 21, 24, & 26-35 • ASE certifications • SP2 certifications • Participation/lab work • Dual credit

		<ul style="list-style-type: none"> • Describe the operational characteristics of a continuously variable transmission (CVT) • Describe the operational characteristics of a hybrid vehicle drive train • Research vehicle service information including fluid type, vehicle service history, service precautions, and technical service bulletins • Drain and refill manual transmission/transaxle and final drive unit; use proper fluid type per manufacturer specification • Identify manual drive train and axle components and configuration • Check and adjust clutch master cylinder fluid level; use proper fluid type per manufacturer specification • Check for hydraulic system leaks • Clean and inspect differential case; check for leaks; inspect housing vent • Check and adjust differential case fluid level; use proper fluid type per manufacturer specification • Drain and refill differential housing • Inspect and replace drive axle wheel studs 			
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<p>DOMAIN Repair</p> <p>Core Standard 4 Students apply and adapt industry procedure to perform service and repairs on various vehicle components and systems</p>	<p>ASTII-4.1 Select and use appropriate tools and technology</p> <p>ASTII-4.2 Implement quality assurance measures and safeguards</p> <p>ASTII-4.3 Evaluate resources that keep workers current in the career field</p> <p>ASTII-4.4 Perform Computerized Engine Diagnosis and complete Repairs</p> <p>ASTII-4.5 Inspect and repair ignition system problems</p> <p>ASTII-4.6 Service fuel, air induction, and exhaust systems</p> <p>ASTII-4.7 Conduct other related engine service activities</p> <p>ASTII-4.8 Demonstrate safe shop practices while working with electrical systems and test Equipment</p> <p>ASTII-4.9 Perform wiring repair</p>	<ul style="list-style-type: none"> • Research vehicle service information, including fluid type, vehicle service history, service precautions, and technical service bulletins • Verify engine operating temperature • Remove and replace spark plugs; inspect secondary ignition components for wear and damage • Retrieve and record diagnostic trouble codes (DTC), OBD monitor status, and freeze frame data; clear codes when applicable • Describe the use of the OBD monitors for repair verification • Inspect, service, or replace air filters, filter housings, and intake duct work • Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; determine necessary action • Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine necessary action • Inspect, test, and service positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform necessary action 	<ul style="list-style-type: none"> • Classroom activities • Written assignments • Lab/shop demonstrations • Lab/shop work • Customer repair work 	<p>9 weeks</p> <p>Reinforced throughout the year</p>	<ul style="list-style-type: none"> • Maintenance & Light Repair (MLR) task sheets • Chapters 27-29 exams • ASE certifications • SP2 certifications • Participation/lab work • Dual credit

*"The ASE/NATEF Maintenance and Light Repair curriculum requires 540 hours of training plus more than 400 hours of classroom and lab time for review, employability competency training, and inclusion of other tasks reviewed, approved, and/or added by the Advisory Committee." (ASE/NATEF Training Plan, 2017)