

Automotive Technology Program Elements
January 2023

Career Cluster: Transportation - Pathway: Automotive Services							
Principles		CTE Concentrator A		CTE Concentrator B		Pathway Capstone	
7213	Principles of Automotive Services	7205	Brake Systems	7212	Steering and Suspensions	7375	Automotive Service Capstone

7213 Principles of Automotive Services	
Course Description	<i>This course gives students an overview of the operating and general maintenance systems of the modern automobile. Students will be introduced to the safety and operation of equipment and tools used in the automotive industry. Students will study the maintenance and light repair of automotive systems. Also, this course gives students an overview of the electrical operating systems of the modern automobile. Students will be introduced to the safety and operation of equipment and tools used in the electrical diagnosis and repair in the automotive electrical industry. Students will study the fundamentals of electricity and automotive electronics.</i>
Pre/Co Req	None
Credits	Credits: 2 semester course, 2 semesters required, 1 credit per semester, 2 credits maximum
Counts Toward	Counts as a directed elective or elective for all diplomas
ITCC Courses	AUTI 100: Basic Automotive Service; AUTI 111: Electrical Systems I

CONTENT STANDARDS AND COMPETENCIES	
Competency #	Competency
Domain	<i>Maintenance and Light Repair</i>
7213-D1.1	Identify proper shop safety practices while in the labs.
7213-D1.2	Identify tools & fasteners used in automotive repair.
7213-D1.3	Identify and explain how the automotive repair industry is structured.
7213-D1.4	Identify and explain the operation of the 8 major systems of the automobile.
7213-D1.5	Identify and explain what EPA, CAFÉ and NHTSA regulations are and how they affect the automotive industry.
7213-D1.6	Identify and perform basic service and maintenance procedures including tire mounting, balancing, and repair.

7213-D1.7	Attain readiness to be certified to use industry standard diagnostic equipment, like ShopKey Pro.
7213-D1.8	Attain readiness to take the SP/2 Mechanical Safety exam.
7213-D1.9	Attain readiness to take the SP/2 Pollution Prevention exam.
Domain	<i>Basic Automotive Electrical</i>
7213-D2.1	Demonstrate safe shop practices while working with electrical systems.
7213-D2.2	Describe the basic laws of electricity and circuit construction.
7213-D2.3	Identify Electrical symbols and components.
7213-D2.4	Calculate resistance, current, and voltage problems using Ohms Laws.
7213-D2.5	Perform voltage, current, and resistance measurements using the proper measurement devices.
7213-D2.6	Perform voltage drop testing on multiplex and non-multiplex circuits.
7213-D2.7	Perform basic battery testing and diagnosis.
7213-D2.8	Identify starting and charging system components and circuits.
7213-D2.9	Diagnose starting and charging system faults.
7213-D2.10	Attain readiness to be certified to use an industry standard multimeter or fluke meter (e.g. Snap-On EEDM504B4).
Domain	<i>Optional Competencies</i>
7213-D3.1	Complete a vehicle inspection.
7213-D3.2	Perform an oil change and demonstrate basic fluid maintenance.
7213-D3.3	Understand fundamentals of the 4-stroke cycle of an internal combustion engine.

SAMPLE ACTIVITIES			
Domain	Technical Skills	Activity	Assessment / Evaluation
Maintenance and Light Repair	<ul style="list-style-type: none"> Students can perform steering and suspension systems diagnosis and repair. 	<ul style="list-style-type: none"> Identify tools & fasteners used in automotive repair. 	<ul style="list-style-type: none"> MLR Task Sheets.
Basic Automotive Electrical	<ul style="list-style-type: none"> Students can demonstrate safe shop practices while working with electrical systems. 	<ul style="list-style-type: none"> Video Demonstration. 	<ul style="list-style-type: none"> Written Safety Exam.
Optional Competencies	<ul style="list-style-type: none"> Students can complete a vehicle inspection. 	<ul style="list-style-type: none"> Lab/shop demonstrations. Lab/shop work. Student test drives. 	<ul style="list-style-type: none"> Customer repair work. ASE Certification Exam.

7205 Brake Systems	
Course Description	<i>This course gives students an in-depth study of vehicle electrical systems. Students will study the fundamentals of electricity and automotive electronics in various automotive systems. Additionally it teaches theory, service and repair of automotive braking systems. This course provides an overview of various mechanical brake systems used on today's automobiles. This course will emphasize professional diagnosis and repair methods for brake systems.</i>
Pre/Co Req	Principles of Automotive Services
Credits	Credits: 2 semester course, 2 semesters required, 1 credit per semester, 2 credits maximum
Counts Toward	Counts as a directed elective or elective for all diplomas
ITCC Courses	AUTI 121: Brake Systems

CONTENT STANDARDS AND COMPETENCIES	
Competency #	Competency
Domain	Brake Systems
7205-D1.1	Demonstrate proper shop safety practices while in the labs.
7205-D1.2	Use and identify tools used to repair brake systems.
7205-D1.3	Explain friction principles and Newton's laws of Motion.
7205-D1.4	Identify and explain operation of braking system components including hydraulic control devices.
7205-D1.5	Perform Disc Brake Inspection and recommend necessary repairs.
7205-D1.6	Perform Drum Brake Inspection and recommend necessary repairs.
7205-D1.7	Adjust parking brakes.
7205-D1.8	Demonstrate resurfacing of drums and rotors including on-car brake lathes.
7205-D2.1	Understand anti-lock braking systems and perform diagnostic procedures: Pull ABS trouble codes; Bleeding anti-locking braking systems; How to use the multimeter
7205-D2.2	Understand driveline service including, differentials, axles, and driveline angles
7205-D2.3	Diagnose if a differential seal is leaking.

SAMPLE ACTIVITIES			
Domain	Technical Skills	Activity	Assessment / Evaluation
Brake Systems	<ul style="list-style-type: none"> Students can perform brake power assist unit diagnosis and repair. 	<ul style="list-style-type: none"> Identify and explain operation of braking system components including hydraulic control devices. 	<ul style="list-style-type: none"> CDX/MLR task sheets / live shop work. Practical evaluation of disc brake inspection.
	<ul style="list-style-type: none"> Students can perform antilock brake and traction control systems diagnosis and repair. 	<ul style="list-style-type: none"> Lab/shop demonstrations. Test drives. 	<ul style="list-style-type: none"> Participation/Lab work.

7212 Steering and Suspensions	
Course Description	<i>This course will study driveline theory and in-car service procedures. Theory and overhaul procedures related to the driveshaft and axle assemblies for front and rear wheel drive vehicles are included as well. Additionally, this course teaches theory, service and repair of automotive steering and suspension systems. It provides an overview of various mechanical, power, and electrical steering and suspension systems used on today's automobiles and will emphasize professional diagnosis and repair methods for steering and suspension systems.</i>
Pre/Co Req	Principles of Automotive Services; Brake Systems
Credits	Credits: 2 semester course, 2 semesters required, 1 credit per semester, 2 credits maximum
Counts Toward	Counts as a directed elective or elective for all diplomas
ITCC Courses	AUTI 122: Steering and Suspension Systems; AUTI 145: Driveline Service

CONTENT STANDARDS AND COMPETENCIES	
Competency #	Competency
Domain	<i>Steering and Suspensions</i>
7212-D1.1	Demonstrate proper shop safety practices while in the labs.
7212-D1.2	Identify tools used for steering and suspension repair.
7212-D1.3	Diagnose steering and suspension concerns and determine worn/defective components.
7212-D1.4	Remove, inspect and service or replace front or rear wheel bearings.
7212-D1.5	Inspect, rotate, mount and balance tires.
7212-D1.6	Diagnose abnormal tire pull and drifting/pulling concerns.
7212-D1.7	Perform Pre-Alignment inspections.
7212-D1.8	Perform 4-wheel alignments.
Domain	<i>Driveline</i>
7212-D2.1	Demonstrate safe shop practices and work habits while working with driveline equipment and lifts.
7212-D2.2	Demonstrate usage of tools for driveline diagnosis and repair.
7212-D2.3	Describe basic power flow of the vehicle driveline.
7212-D2.4	Identify correct fluids for manual and automatic transmissions and drive axles.

7212-D2.5	Inspect for sources of leaks.
7212-D2.6	Remove and Replace drive axle bearings, axle shafts, seals, and wheel studs.
7212-D2.7	Remove and Replace universal joints, yokes, and shafts.
7212-D2.8	Remove and Replace and/or repair constant velocity joints and/ or half-shafts.
7212-D2.9	Locate specifications for drivelines from repair databases.
7212-D3.1	Demonstrate operation of a scan tool.
7212-D3.2	Understand hybrid automotive systems and alternative fuels.
7212-D3.3	Understand drive trains, manual transmissions, and auto SIR systems.

SAMPLE ACTIVITIES			
Domain	Technical Skills	Activity	Assessment / Evaluation
<i>Steering and Suspensions</i>	<ul style="list-style-type: none"> • Students can perform steering and suspension systems diagnosis and repair. • Students can perform wheel alignment diagnosis, adjustment, and repair. • Students can perform wheel and tire diagnosis and repair. 	<ul style="list-style-type: none"> • Diagnose steering and suspension concerns and determine worn/defective components. • Perform pre-alignment inspection. • Inspect tire wear pattern. 	<ul style="list-style-type: none"> • CDX/MLR Tasks. • ASE certification test. • Steering and suspension component identification. • Perform alignment/lab assignment. • Lab activities/question & answer discussion.
<i>Driveline</i>	<ul style="list-style-type: none"> • Students can demonstrate usage of tools for driveline diagnosis and repair. 	<ul style="list-style-type: none"> • Demonstration of diagnostic tools. 	<ul style="list-style-type: none"> • Return demonstration on customer repair work.

7375 Automotive Service Capstone	
Course Description	<i>This course further explores important skills and competencies within the Automotive Service Technology Pathway. Topics such as Steering & Suspension, Engine Repair, Climate Control, and Driveline Service. Additionally, Co-Op and Internship opportunities will be available for students.</i>
Pre/Co Req	Principles of Automotive Services; Brake Systems; Steering and Suspensions
Credits	Credits: 2 semester course, 2 semester required, 1-3 credits per semester, 6 credits max
Counts Toward	Counts as a Directed Elective or Elective for all diplomas
ITCC Courses	AUTI 141: Engine Fundamentals and Repair; AUTI 131 Engine Performance System I
Promoted Certifications	ASE G1; ASE A1-A8

CONTENT STANDARDS AND COMPETENCIES	
Competency #	Competency
Domain	<i>Engine Performance and Repair</i>
7212-C-D1.1	Demonstrate proper shop safety practices while in the labs.
7212-C-D1.2	Explain four-stroke cycle fundamentals and volumetric efficiency.
7212-C-D1.3	Identify and explain the operation of fuel injection systems.
7212-C-D1.4	Identify and explain operation of ignition systems.
7212-C-D1.5	Identify and explain operation of vehicle emission systems.
7212-C-D1.6	Identify and explain operation of sensors and actuators.
7212-C-D1.7	Retrieve DTCs and freeze frame data with a scan tool.
7212-C-D1.8	Diagnose fuel and ignition faults.
7212-C-D1.9	Describe the major engine operating systems and their function. Identify engine configurations.
7212-C-D1.10	Demonstrate basic engine diagnosis including compression and leak down testing.
Domain	<i>Engine Performance Systems</i>
7212-C-D2.1	Demonstrate knowledge of computer sensors and inputs.
7212-C-D2.2	Demonstrate knowledge of computer actuators and outputs.

7212-C-D2.3	Diagnose inputs and outputs.
7212-C-D2.4	Describe the function of the OBD II Monitors.
7212-C-D2.5	Diagnose OBD II system fault codes and determine repair needed.
7212-C-D2.6	Determine if OBD II monitors have executed.
7212-C-D2.7	Attain readiness to take the VERUS Navigation and Scanner Certification exam.
Domain	Engine Fundamentals
7212-C-D3.1	Identify tools used for common engine repair.
7212-C-D3.2	Describe the major engine operating systems and their function.
7212-C-D3.3	Identify engine configurations.
7212-C-D3.4	Describe engine components and their functions.
7212-C-D3.5	Describe engine lubricants and sealing systems.
7212-C-D3.6	Demonstrate use of precision measuring equipment.
7212-C-D3.7	Describe fasteners and torque requirements and procedures.
7212-C-D3.8	Inspect cylinder long block components and determine needed repairs.
7212-C-D3.9	Properly install camshaft and timing chain(s) and /or belts.
7212-C-D3.10	Disassemble and reassemble engines to industry standards.
7212-C-D3.11	R & R engine assembly.
7212-C-D3.12	Attain readiness to take Snap on Torque Electrical Certification exam.
7212-C-D3.13	Attain readiness to take Snap on Torque Mechanical Certification exam.
Domain	Electrical Systems
7212-C-D4.1	Describe and explain analog and digital signals.
7212-C-D4.2	Explain and diagnose body modules and their function.
7212-C-D4.3	Demonstrate knowledge of wiring and circuit diagrams.
7212-C-D4.4	Demonstrate knowledge of voltage, current, and resistance measurements using meters and scopes.
7212-C-D4.5	Diagnose service and repair electrical/electronic system faults.
7212-C-D4.6	Demonstrate the ability to diagnose automotive circuits using electrical schematics.

7212-C-D4.7	Explain Hybrid Electrical systems and their operation.
7212-C-D4.8	Explain/demonstrate Hybrid vehicle service safety precautions.
7212-C-D4.9	Explain and diagnose advanced automotive systems and networks.
7212-C-D4.10	Utilize scan tools, lab scopes, and other electronic diagnostic equipment.
Domain	Climate Control
7212-C-D5.1	Demonstrate proper handling of refrigerants.
7212-C-D5.2	Identify tools and equipment used in climate control systems.
7212-C-D5.3	Identify all components of the heating and air conditioning system.
7212-C-D5.4	Explain the purpose and function of the heating and air conditioning systems.
7212-C-D5.5	Explain refrigeration theory.
7212-C-D5.6	Diagnose service and repair heating and air conditioning components.
7212-C-D5.7	Recover and recycle refrigerants using approved equipment.
7212-C-D5.8	Demonstrate knowledge of automatic climate control systems.
7212-C-D5.9	Diagnose automatic and manual climate control systems.
7212-C-D5.10	Explain hybrid climate control system operation.

SAMPLE ACTIVITIES			
Domain	Technical Skills	Activity	Assessment / Evaluation
Engine Performance and Repair	<ul style="list-style-type: none"> Students can perform computerized engine controls diagnosis and repair. Students can perform ignition systems diagnosis and repair. Students can perform fuel, air induction, and exhaust systems diagnosis and repair. Students can perform emissions control systems diagnosis and repair. 	<ul style="list-style-type: none"> Demonstrate knowledge of computer actuators and outputs. Lab/shop demonstrations. Lab/shop work. 	<ul style="list-style-type: none"> CDX/MLR task sheets. Customer repair work. ASE Certification Exam.
Engine Fundamentals	<ul style="list-style-type: none"> Students can describe engine components and their functions. 	<ul style="list-style-type: none"> Lab/shop demonstrations. 	<ul style="list-style-type: none"> Customer repair work.

	<ul style="list-style-type: none"> • Students can describe fasteners and torque requirements and procedures. 	<ul style="list-style-type: none"> • Lab/shop work. • Demonstration of engine components. • Research proper shop information pertaining to task sheet. 	<ul style="list-style-type: none"> • ASE Certification Exam. • Engine component identification exam. • Completion of task sheet.
Electrical Systems	<ul style="list-style-type: none"> • Students can perform battery and electrical system diagnosis and repair. • Students can perform starting and charging system diagnosis and repair. • Students can perform lighting systems diagnosis and repair. • Students can perform warning devices, gauges, and accessories diagnosis and repair. 	<ul style="list-style-type: none"> • Lab/shop demonstrations. • Lab/shop work. • Research proper shop information pertaining to task sheet. • Practical evaluation of a solder repair. 	<ul style="list-style-type: none"> • Customer repair work. • ASE Certification Exam. • Completion of task sheet. • Perform a wiring repair using proper soldering technique.
Climate Control	<ul style="list-style-type: none"> • Students can recover and recycle refrigerants using approved equipment. 	<ul style="list-style-type: none"> • Lab/shop demonstrations. • Lab/shop work. 	<ul style="list-style-type: none"> • Customer repair work. • ASE Certification Exam.