AUTOMOTIVE TECHNOLOGY

AUTO 111. Automotive Mechanics Basics
4 Credits (4)
Basic maintenance procedures of the major components of the automobile using service repair manuals, hand and power tools, precision measurement equipment, fasteners and chemicals. Restricted to: Community Colleges only.

AUTO 112. Basic Gasoline Engines
5 Credits (2+6P)
Principles of gasoline engine operation. Identification, design, function of engine components; engine disassembly and reassembly; trouble shooting, and rebuilding heads. May be repeated up to 5 credits.
Learning Outcomes

1. Recall vehicle service information, including fluid types, engine operation, service history, technical bulletins, and recalls for xEVs and ADAS-equipped vehicles.
2. Analyze and interpret on-board diagnostics (OBD) data, including DTCs, monitor status, and freeze frame data, and clear codes when necessary.
3. Inspect engine assembly for leaks and other issues, and determine required actions for maintenance or repair.
4. Verify the proper operation of engine components, including mechanical timing, covers, and warning indicators.
5. Apply appropriate service precautions for internal combustion engine repairs, particularly for xEVs.
6. Inspect and evaluate cylinder head and valve train components for wear, damage, and proper functionality, making necessary adjustments or replacements.
7. Analyze and assess engine block components, including vibration dampers and crankshaft assembly, for wear or damage.
8. Perform engine oil and filter changes and coolant system maintenance, ensuring correct fluid types and system integrity.
9. Test and troubleshoot cooling system components, including radiators, pumps, and thermostats, to identify and resolve overheating or leakage issues. 1
10. Examine and replace drive belts, tensioners, and pulleys, ensuring proper alignment and operation. 1
11. Inspect and replace oil temperature and pressure sensors, as well as auxiliary coolers, based on diagnostic results. 1
12. Evaluate and adjust engine cooling and lubrication system components for optimal performance and repair as needed.

AUTO 113. Automotive Electricity and Electronics PT I
4 Credits (2+4P)
Topics include mastery of DC electricity, use of digital multimeters, troubleshooting electrical problems in starting, charging and accessory systems. May be repeated up to 4 credits.
Learning Outcomes

1. Research and interpret vehicle service information, system architecture, wiring diagrams, and procedures for electrical/electronic systems, including xEV, ADAS, and high-voltage systems.
2. Identify and explain the function and configuration of key electrical/electronic system components (fuses, relays, resistors, sensors, modules, actuators, networks).
3. Use proper diagnostic tools (DMM, oscilloscope, graphing multimeter, scan tool) to measure voltage, current, resistance, and circuit operation; interpret results.
4. Diagnose and repair electrical faults, including shorts, opens, grounds, resistance issues, excessive parasitic draw, and voltage drops; verify proper circuit operation.
5. Inspect, test, and service wiring, terminals, connectors, and harnesses using appropriate procedures, tools, and soldering techniques.
6. Test and maintain low-voltage batteries, cables, and connections; perform state-of-charge/load tests and charging procedures; jump-start and maintain memory functions.
7. Diagnose and repair low-voltage starting systems including slow/no crank conditions, idle-stop/start systems, and electrical/mechanical faults.
8. Inspect, test, and service charging system components (alternator, drive belts, tensioners, pulleys) and identify causes of undercharge, overcharge, or no-charge conditions.
9. Inspect, aim and troubleshoot lighting systems, including interior/exterior lamps, sockets, switches, and wiring; correct intermittent, dim, or non-functioning lights. 1
10. Inspect and diagnose instrument clusters and driver information systems, including warning lights, gauges, sensors, and maintenance indicators. 1
11. Inspect, diagnose and repair body electronic systems (power locks/windows, wipers, security, infotainment, seat/airbag systems); verify module communication and function. 1
12. Demonstrate safety procedures for xEV high-voltage systems; locate, describe, and follow correct steps to de-energize/re-energize systems and protect components and personnel.

AUTO 114. Automotive Electricity and Electronics PT II
4 Credits (2+4P)
Advanced AC and DC automotive electronic circuits. Troubleshooting electronically controlled components including supplemental restraint systems and convenience accessories. Restricted to Community Colleges campuses only.
Prerequisite: AUTO 113.
Learning Outcomes

1. Understand and demonstrate safety rules related to electronically controlled automotive systems.
2. Diagnosis and demonstrate knowledge of series, parallel, and combination circuits, and their applications as applied to automotive repair.
3. Demonstrate use of wiring diagrams as a diagnostic aide.
4. Demonstrate use of meters, handheld labscopes, scan tools, and other diagnostic equipment.
5. Demonstrate use of repair manuals, both hard copy and electronic.
6. Demonstrate knowledge, diagnose and repair Air Bag Supplemental Inflatable Restraint systems
7. Demonstrate knowledge, diagnose and repair various convenience electronic systems.
8. Interpret customer concerns, create and complete a diagnostic routine and successfully repair an electrical problem.
9. Diagnose and repair starting and charging systems.

AUTO 115. Automotive Engine Repair
4 Credits (2+4P)
Principles of gasoline engine operation. Identification of engine parts, operation, and function. Disassembly and reassembly. Engine problem diagnoses (cooling system, lubrication system, engine noises). Restricted to Community Colleges only.

Learning Outcomes

1. Understand internal combustion engine theory.
2. Identify all components of an engine and their function.
3. Identify worn engine components and determine necessary repairs.
4. Effectively present engine issues and corrections using verbal and written communication.
5. Diagnose cooling system issues and the effect on various components.
6. Rebuild/ reassemble an engine to specifications.
7. Understand the operation and rationale of forced induction.
8. Identify methods of increasing engine efficiency.

AUTO 117. Electronic Analysis and Tune-Up of Gasoline Engines
5 Credits (2+6P)
Theory and operation of ignition and emission control systems and fuel system. Use of troubleshooting equipment and diagnostic equipment.
Prerequisite: AUTO 120 or consent of instructor.

AUTO 119. Manual Transmission/Clutch
5 Credits (2+6P)
Manual transmission, transfer cases, and clutch operating principles. Students will diagnose problems, remove and replace, disassemble, repair, and assemble units.

AUTO 120. Electrical Systems
4 Credits (2+4P)
Troubleshooting and repair of starters, alternators, and associated circuits. Reading electrical diagrams, diagnosis and repair of electrical accessories.
Prerequisite: consent of instructor.

AUTO 122. Automotive Brakes
4 Credits (2+4P)
Focus is on theory, diagnosis, and service of drum, disc, and anti-lock braking systems, brake component machining, hydraulic component reconditioning, friction and hardware replacement. May be repeated up to 4 credits.

Learning Outcomes

1. Research and interpret vehicle service information, brake system types (hydraulic, disc, drum, electric), service procedures, and manufacturer specifications for fluid and components, including xEV and ADAS-equipped vehicles.
2. Identify and explain brake system components and configurations, including power-assist units, electronic brake control systems (ABS, TCS, ESC), and regenerative braking systems.
3. Retrieve, record, and clear diagnostic trouble codes (DTCs) and perform service mode activation, calibration, initialization, and relearn procedures when required.
4. Diagnose hydraulic brake system concerns using pressure principles (Pascal's Law); inspect and test brake fluid, master cylinder, lines, hoses, and fittings; determine needed action.
5. Bleed, replace, or test brake fluids, fabricate lines, and ensure correct type and contamination-free hydraulic system operation.
6. Inspect, remove, replace, and/or service drum brake components including drums, shoes, wheel cylinders, springs, levers, adjusters, and support plates.
7. Inspect, measure, service, or refinish disc brake components including rotors, calipers, pads, pistons, hardware, and mounting surfaces; determine rotor serviceability.
8. Diagnose and correct brake system performance issues such as pulling, noise, dragging, pulsation, and poor stopping, in both hydraulic and mechanical systems.
9. Inspect and test power-assist units, including vacuum and hydraulic boosters; identify operational concerns, perform functional checks, and inspect related components. 1
10. Inspect, service, and replace related systems: wheel bearings (sealed and serviceable), parking brake systems (manual and electric), wheel studs, and brake light/indicator systems. 1
11. Diagnose and repair electronic brake systems (ABS, TCS, ESC); identify components, describe function, and evaluate system performance using appropriate tools. 1
12. Describe and test regenerative braking system functions and perform electronic brake system bleeding procedures safely and accurately.

AUTO 123. Job Shadowing
1 Credit (1)
Observing a professional in a real-world work setting, while gaining on-the-job training. Student will meet in a weekly class or online.

Learning Outcomes

1. Work with colleagues in the diagnosing and repair of automobiles.
2. Understand basic tool needs to meet industry requirements.
3. Prepare for various pay scales (straight time, flat-rate, hourly).
4. Understand daily operations in a live shop setting.
5. Understand the roles in the automotive field to include Technician, Service Writer, Shop Foreman, and Service Manager.

AUTO 124. Automotive Heating and Air Conditioning
4 Credits (2+4P)
R12 and R134A air conditioning systems maintenance diagnosis and repair. R12 to R134A conversion procedures. Troubleshooting automatic temperature controls and leak detection. May be repeated up to 4 credits.

Learning Outcomes

1. Research and interpret vehicle HVAC service information, including refrigerant/oil types, diagnostic procedures, and safety precautions related to xEVs and ADAS-equipped vehicles.
2. Identify HVAC system components and configurations, including compressors, condensers, evaporators, control panels, ducts, and sensors.
3. Use diagnostic tools and procedures to retrieve DTCs, interpret A/C performance test results, and analyze system pressures, temperatures, and operating noises.
4. Diagnose and repair refrigerant circuit faults, including leaks, pressure imbalances, abnormal compressor operation, and restricted flow components (expansion valves, orifice tubes, desiccants).
5. Inspect, service, or replace HVAC components, such as compressors, condensers, evaporators, receiver/driers, hoses, and system seals; select proper oil type and quantity per OEM specs.
6. Diagnose and service heating and engine cooling system interactions with HVAC, including hoses, heater cores, control valves, and electric heating systems.
7. Inspect and diagnose HVAC airflow and cabin control components, including blower motors, filters, ducts, switches, doors, resistors, relays, and protection devices.
8. Check operation of HVAC control systems, including manual, automatic, mechanical, electrical, and vacuum-based systems; service control panels and actuators.

9. Demonstrate proper handling and recovery of refrigerants, including system evacuation, recovery, recycling, recharging, oil management, and refrigerant identification. 1
10. Safely operate and maintain refrigerant service equipment and comply with environmental regulations for refrigerant labeling, storage, and handling.

AUTO 125. Brakes
5 Credits (2+6P)
Theory of operation, diagnosis, repair, and maintenance of disc and drum brakes; safety and use of special tools. May be repeated up to 5 credits.
Learning Outcomes

1. Research and interpret vehicle service information, brake system types (hydraulic, disc, drum, electric), service procedures, and manufacturer specifications for fluid and components, including xEV and ADAS-equipped vehicles.
2. Identify and explain brake system components and configurations, including power-assist units, electronic brake control systems (ABS, TCS, ESC), and regenerative braking systems.
3. Retrieve, record, and clear diagnostic trouble codes (DTCs) and perform service mode activation, calibration, initialization, and relearn procedures when required.
4. Diagnose hydraulic brake system concerns using pressure principles (Pascal's Law); inspect and test brake fluid, master cylinder, lines, hoses, and fittings; determine needed action.
5. Bleed, replace, or test brake fluids, fabricate lines, and ensure correct type and contamination-free hydraulic system operation.
6. Inspect, remove, replace, and/or service drum brake components including drums, shoes, wheel cylinders, springs, levers, adjusters, and support plates.
7. Inspect, measure, service, or refinish disc brake components including rotors, calipers, pads, pistons, hardware, and mounting surfaces; determine rotor serviceability.
8. Diagnose and correct brake system performance issues such as pulling, noise, dragging, pulsation, and poor stopping, in both hydraulic and mechanical systems.
9. Inspect and test power-assist units, including vacuum and hydraulic boosters; identify operational concerns, perform functional checks, and inspect related components. 1
10. Inspect, service, and replace related systems: wheel bearings (sealed and serviceable), parking brake systems (manual and electric), wheel studs, and brake light/indicator systems. 1
11. Diagnose and repair electronic brake systems (ABS, TCS, ESC); identify components, describe function, and evaluate system performance using appropriate tools. 1
12. Describe and test regenerative braking system functions and perform electronic brake system bleeding procedures safely and accurately.

AUTO 126. Suspension, Steering, and Alignment
5 Credits (2+6P)
Types of steering systems, suspension maintenance and repair, four-wheel alignment procedures. May be repeated up to 5 credits.
Learning Outcomes

1. Research and interpret vehicle service data including steering/suspension systems, fluid specifications, service procedures, and manufacturer recommendations for xEVs and ADAS-equipped vehicles.
2. Identify and explain suspension, steering, and wheel alignment components, including electronically controlled systems and their functions.
3. Retrieve, record, and clear diagnostic codes related to suspension and steering systems; disable and enable SRS/airbag systems according to safety procedures.
4. Diagnose and interpret suspension and steering system symptoms (uneven ride height, noises, binding, fluid leaks, tire wear, and abnormal steering behavior); determine corrective action.
5. Inspect and service power steering systems (hydraulic and electric), including pumps, belts, hoses, fluids, gears, racks, and related components.
6. Remove, inspect, adjust, and/or replace steering system parts including tie rods, linkages, steering shafts, columns, knuckles, and bushings.
7. Inspect, replace, and service suspension system parts including control arms, struts, shocks, ball joints, sway bars, torsion bars, bushings, and electronically controlled components.
8. Perform and evaluate wheel alignment procedures including camber, caster, toe, thrust angle, setback, and SAI; explain alignment angles and their impact on handling and tire wear.
9. Prepare a vehicle for alignment, perform pre-alignment inspections, and reset steering angle sensors; determine need for ADAS recalibration. 1
10. Inspect, service, and replace wheel bearings, hubs, and mountings; check for looseness, noise, and proper installation. 1
11. Inspect, rotate, mount, balance, and repair tires and wheels; verify tire pressure, inspect TPMS systems, and perform relearn/calibration procedures. 1
12. Diagnose wheel and tire concerns such as vibration, noise, shimmy, runout, and pull; determine needed action.

AUTO 127. Basic Automatic Transmission
4 Credits (2+4P)
Theory and operation of the automatic transmission; maintenance, troubleshooting, diagnosis, and repair of components. May be repeated up to 4 credits.
Learning Outcomes

1. Recall and interpret vehicle service information, including fluid types, service history, precautions, TSBs, and ADAS/xEV-related systems.
2. Identify and describe transmission and transaxle types, components, and operational principles of CVT, DCT, hybrid, and xEV drive systems.
3. Retrieve, interpret, and clear diagnostic trouble codes (DTCs), monitor status, and freeze frame data using diagnostic tools.
4. Inspect and evaluate fluid condition, levels, and possible leaks on transmissions/transaxles both with and without dipsticks.
5. Diagnose and analyze power flow, gear ratio issues, and hydraulic/pressure concerns using mechanical and hydraulic principles (Pascal's Law).
6. Differentiate and interpret between engine performance and transmission/transaxle issues; determine appropriate corrective actions.
7. Perform and evaluate stall, lock-up converter, and electronic pressure control tests; determine necessary service or repair actions.
8. Diagnose and repair electronic transmission/transaxle control systems using manufacturer data and diagnostic tools.
9. Inspect, adjust, and/or replace components such as valve shift linkage, range sensors, powertrain mounts, and park/neutral switches. 1
10. Drain, replace, and refill transmission fluids and filters using manufacturer specifications; perform system relearn procedures. 1

11. Inspect, test, and repair external seals, gaskets, bushings, and electrical/electronic circuits within the transmission system. 1
12. Remove, reinstall, and inspect off-vehicle components including the transmission/transaxle, torque converter, oil cooler, and converter flex plate; evaluate wear and mating surfaces.

AUTO 129. Automotive Steering and Suspension
4 Credits (2+4P)
Diagnosis/service of suspension components including shocks, springs, ball joints, manual and power steering systems and four wheel alignment are some areas covered. May be repeated up to 4 credits.
Learning Outcomes
1. Research and interpret vehicle service data including steering/suspension systems, fluid specifications, service procedures, and manufacturer recommendations for xEVs and ADAS-equipped vehicles.
2. Identify and explain suspension, steering, and wheel alignment components, including electronically controlled systems and their functions.
3. Retrieve, record, and clear diagnostic codes related to suspension and steering systems; disable and enable SRS/airbag systems according to safety procedures.
4. Diagnose and interpret suspension and steering system symptoms (uneven ride height, noises, binding, fluid leaks, tire wear, and abnormal steering behavior); determine corrective action.
5. Inspect and service power steering systems (hydraulic and electric), including pumps, belts, hoses, fluids, gears, racks, and related components.
6. Remove, inspect, adjust, and/or replace steering system parts including tie rods, linkages, steering shafts, columns, knuckles, and bushings.
7. Inspect, replace, and service suspension system parts including control arms, struts, shocks, ball joints, sway bars, torsion bars, bushings, and electronically controlled components.
8. Perform and evaluate wheel alignment procedures including camber, caster, toe, thrust angle, setback, and SAI; explain alignment angles and their impact on handling and tire wear.
9. Prepare a vehicle for alignment, perform pre-alignment inspections, and reset steering angle sensors; determine need for ADAS recalibration. 1
10. Inspect, service, and replace wheel bearings, hubs, and mountings; check for looseness, noise, and proper installation. 1
11. Inspect, rotate, mount, balance, and repair tires and wheels; verify tire pressure, inspect TPMS systems, and perform relearn/calibration procedures. 1
12. Diagnose wheel and tire concerns such as vibration, noise, shimmy, runout, and pull; determine needed action.

AUTO 130. Introduction to Transportation Industry
3 Credits (3)
State and national traffic statutes that relate to the trucking industry. A Commercial Driver's License Learner s Permit will be obtained through successful completion of the course.
Prerequisites: Must be 18 years of age, have a current driver's license and consent of instructor.

AUTO 131. Class A CDL
3 Credits (1+4P)
Instruction in how to perform proper pre-trip inspection; hands-on training with a tractor-trailer unit on the backing range and street driving to develop skills necessary to pass Class A DCL exam. Restricted to Community Colleges campuses only.
Prerequisite(s): Class A CDL restricted license (permit) and either restriction of D.O.T.

AUTO 132. Automotive Air-Conditioning and Heating Systems
4 Credits (2+4P)
Theory and operation, reading schematic diagrams, troubleshooting, repair, and replacement operations performed. May be repeated up to 4 credits.
Learning Outcomes
1. Research and interpret vehicle HVAC service information, including refrigerant/oil types, diagnostic procedures, and safety precautions related to xEVs and ADAS-equipped vehicles.
2. Identify HVAC system components and configurations, including compressors, condensers, evaporators, control panels, ducts, and sensors.
3. Use diagnostic tools and procedures to retrieve DTCs, interpret A/C performance test results, and analyze system pressures, temperatures, and operating noises.
4. Diagnose and repair refrigerant circuit faults, including leaks, pressure imbalances, abnormal compressor operation, and restricted flow components (expansion valves, orifice tubes, desiccants).
5. Inspect, service, or replace HVAC components, such as compressors, condensers, evaporators, receiver/driers, hoses, and system seals; select proper oil type and quantity per OEM specs.
6. Diagnose and service heating and engine cooling system interactions with HVAC, including hoses, heater cores, control valves, and electric heating systems.
7. Inspect and diagnose HVAC airflow and cabin control components, including blower motors, filters, ducts, switches, doors, resistors, relays, and protection devices.
8. Check operation of HVAC control systems, including manual, automatic, mechanical, electrical, and vacuum-based systems; service control panels and actuators.
9. Demonstrate proper handling and recovery of refrigerants, including system evacuation, recovery, recycling, recharging, oil management, and refrigerant identification. 1
10. Safely operate and maintain refrigerant service equipment and comply with environmental regulations for refrigerant labeling, storage, and handling.

AUTO 137. Fuel Systems and Emission Controls
4 Credits (2+4P)
Covers theory and operation of fuel system and emission control. Troubleshooting, vacuum diagrams, overhaul, repair and adjustment of carburetion and fuel injection.
Prerequisites: AUTO 117 or consent of instructor.

AUTO 160. Hybrid\Electric Vehicles
4 Credits (2+4P)
Theory and operation of Hybrid and Electric vehicles with emphasis on electrical motor subsystems and battery management systems.
Prerequisite: AUTO 113, AUTO 115.
Prerequisite/Corequisite: AUTO 205.
Learning Outcomes
1. Use automotive scanners and test equipment effectively.
2. Explain the difference between hybrid and electrical vehicles.
3. Identify faulty electrical components and determine necessary repairs.

4. Effectively present issues and corrections using verbal and written communication.
5. Demonstrate proper safety when working with hybrid/EV batteries.
6. Demonstrate knowledge of differences between hybrid and fully electric vehicles and their benefits.
7. Perform routine service on hybrid and electric vehicles.

AUTO 162. Advanced Non-Structural Repair I
4 Credits (2+4P)
This course will involve the students in all phases of minor non-structural collision damage repairs. It will encompass sheet metal repair, advanced panel replacement and alignment.
Prerequisite(s): AUTO 161.

AUTO 164. Automotive Industry Collision Repair I
4 Credits (2+4P)
This advanced course is a continuation of AUTO 161, 162, and 163. This course will incorporate all areas of major non-structural collision damage repair. Through practical application the student will learn how to effectively repair all heavy collision damage using current I-CAR repair standards and procedures.
Prerequisite(s): AUTO 163.

AUTO 165. Automotive Industry Collision Repair II
4 Credits (2+4P)
This advanced course is a continuation of AUTO 164 with emplasis on time efficiency. This course will involve the student in all areas of major collision damage repair. The student will be exposed to all applicable I-CAR industry procedures and standards involved in sheet metal and composite panel repair.
Prerequisite(s): AUTO 164.

AUTO 172. Introduction to Automotive Refinishing
4 Credits (2+4P)
This course is designed to incorporate all aspects of surface preparation, paint safety, refinishing materials, and refinishing fundamentals. Students will receive instructions for the application of acrylic enamel and base coat/clear coat refinishing systems.

AUTO 174. Intermediate Automotive Refinishing
4 Credits (2+4P)
This course encompasses all areas of surface preparation, damage repair and refinishing procedures that are necessary for achieving a proper spot repair. Students will also be exposed to safe work habits in the refinishing area and correct automotive detailing procedures.
Prerequisite(s): AUTO 172.

AUTO 176. Automotive Color Adjustment & Blending
4 Credits (2+4P)
This course will help develop the skills needed to match any type of paint. It will expose the student to color theory, color evaluation, color matching, and other color adjustment factors. The student will be instructed in multiple panel paint blending techniques as well.
Prerequisite(s): AUTO 174.

AUTO 178. Automotive Overall Refinishing
4 Credits (2+4P)
This course encompasses all areas of automotive refinishing. This advanced course is a continuation of AUTO 176 with emphasis in achieving industry refinishing times and standards consistent with that of I-CAR. The student will be exposed to surface preparation and refinishing techniques involved with overall coat/clear coat refinishing system.
Prerequisite(s): AUTO 176.

AUTO 181. Frame and Structural Repair
4 Credits (2+4P)
This course will involve the student in all areas of frame and structural damage repairs. Through theory and practical application, the student will learn how to diagnose and repair various types of damage include: mash, twist, sag, and side sway. This course will expose the students to safe work habits while using measuring and straightening equipment.
Prerequisite(s): AUTO 165.

AUTO 182. Structural Panel Replacement
4 Credits (2+4P)
This course is a continuation of AUTO 181 with infancies in structural panel replacement. The student will be exposed to frame and unibody measuring equipment and their proper use in sectioning procedures. Through theory and practical application the student will learn how to ID structural components, properly separate spot welds, position and weld new body panels in place.
Prerequisite(s): AUTO 181.

AUTO 200. Engine Performance
4 Credits (2+4P)
Theory and operation of ignition, emission control systems, fuel systems, and exhaust systems. Use of troubleshooting and diagnostic equipment. May be repeated up to 4 credits.
Prerequisite/Corequisite: AUTO 113, AUTO 115.
Learning Outcomes
1. Use automotive scanners and test equipment effectively
2. Identify all emission control components of an engine and their function
3. Identify faulty ignition components and determine necessary repairs
4. Effectively present engine issues and corrections using verbal and written communication
5. Diagnose fuel system issues and the effect on various components
6. Demonstrate knowledge of differences between different fuel delivery methods and their benefits
7. Understand the operation and rationale of forced induction
8. Identify methods of increasing engine efficiency

AUTO 201. Engine Performance I
4 Credits (2+4P)
Theory, function, service and analysis of engine related subsystems including ignition, fuel, starting, and charging systems. Emphasis is placed on diagnosis and operation of electronic engine control management systems. Restricted to Community Colleges only.

AUTO 203. Engine Performance II
4 Credits (2+4P)
Study of engine management systems and emission control systems, their function and relationship to vehicle performance and air pollution. Emphasis is placed on the analysis and repair of non-compliant vehicles. Restricted to Community Colleges only.
Prerequisite: AUTO 201.
Learning Outcomes
1. Be able to explain basic electrical theories.
2. Be able to explain basic and advanced engine designs and engine operating theory.
3. Be able to explain engine cooling and lubricating systems.
4. Be able to explain intake and exhaust systems
5. Test battery, starting and charging systems
6. Test ignition systems including point type, electronic trigger type, and distributor-less systems.
7. Test automotive fuel system including fuel tanks, lines, filters and pumps.

8. Test basic electronic fuel injection systems.
9. Test automotive computer input devices and controlled devices 1
10. Demonstrate ability to work with PC based automotive software including Alldata,

AUTO 205. Manual Drive Train and Axles
4 Credits (2+4P)
Operation, diagnosis, maintenance, repair or replacement of manual transmissions, clutch assemblies, differentials, drivelines, axles, and manual transaxles. May be repeated up to 4 credits.

Learning Outcomes

1. Research and interpret vehicle service information, including fluid types, service precautions, technical bulletins, and manufacturer specifications, especially for xEVs and ADAS-equipped vehicles.
2. Identify and describe components and configurations of manual drive trains, clutches, axles, CV/universal joints, and four-wheel/all-wheel drive systems.
3. Retrieve, record, and clear diagnostic trouble codes (DTCs), freeze frame data, and monitor status using diagnostic equipment.
4. Inspect and evaluate fluid conditions, seals, leaks, and perform necessary fluid changes for manual transmissions, differentials, and transfer cases using correct specifications.
5. Diagnose and troubleshoot drive train and clutch-related issues such as slippage, noise, vibration, pulsation, and fluid concerns; determine appropriate repairs.
6. Inspect, adjust, or replace clutch components including pedal linkage, cables, pressure plates, flywheels, and hydraulic systems.
7. Service and repair shift linkage systems by adjusting, lubricating, or replacing cables, pivots, brackets, and bushings.
8. Inspect, test, and replace drive shaft, half shaft, CV joints, and universal joint components; measure driveline angles, shaft runout, and check balance and phasing.
9. Inspect and maintain differential housings, fluid levels, companion flanges, seals, and gear assemblies; assess for leaks and proper function. 1
10. Demonstrate knowledge of ring and pinion gear setup, including adjustments for depth, preload, backlash, and gear contact patterns. 1
11. Inspect and service drive axles, including wheel studs, shaft seals, bearings, retainers, and measuring runout and endplay. 1
12. Identify and resolve four-wheel and all-wheel drive concerns, including shifting issues, tire size mismatches, locking mechanisms, and fluid leaks.

AUTO 206. Automatic Transmissions
5 Credits (2+6P)
Operation, diagnosis, maintenance, and repair of automatic transmissions including rear wheel drive, front wheel drive, and electronically controlled transmissions and transaxles. Restricted to Community Colleges only.

AUTO 208. Introduction to Alternative Fueled Vehicles
3 Credits (3)
Course will familiarize student with conditions that are resulting in the alternative fueled vehicle movement as well as the design and safety precautions unique to each alternative fuel. Propulsion systems covered include electric vehicles, bio-fueled vehicles, hybrid-electric vehicles and hydrogen powered vehicles, along with other emerging technologies as appropriate. Restricted to: Community Colleges only.
Prerequisite(s): AUTO 113 and AUTO 114.

AUTO 209. Hybrid Vehicle Service Techniques
3 Credits (3)
Designed for experienced automotive technicians, this course will cover safety procedures, design, operational overview and service techniques as well as minor diagnosis and repair of all classifications of hybrid-electric vehicles. Each student must possess legal Class '0' high voltage gloves and liners to attend this class. Restricted to: Community Colleges only.
Prerequisite(s): AUTO 113 and AUTO 114.

AUTO 210. Light Diesel
4 Credits (2+4P)
Theory and operation of light duty diesel engines with emphasis on highway diesel usage including major engine subsystems and fuel management systems.
Prerequisite/Corequisite: AUTO 113, AUTO 115.

Learning Outcomes

1. Use automotive scanners and test equipment effectively.
2. Identify all emission control components included on diesel engines and their function.
3. Identify faulty emission components and determine necessary repairs.
4. Effectively present engine issues and corrections using verbal and written communication
5. Diagnose fuel system issues and the effect on various components.
6. Demonstrate knowledge of differences between different fuel delivery methods and their benefits.
7. Understand the operation and rationale of forced induction.
8. Identify methods of increasing engine efficiency.

AUTO 221. Cooperative Experience I
1-6 Credits
Supervised cooperative work program. Student is employed in an approved occupation and supervised and rated by the employer and instructor. Student will meet in a weekly class. Graded S/U.
Prerequisite: consent of instructor.

AUTO 255. Special Problems in Automotive Technology
1-5 Credits
Individual studies in areas directly related to automotive technologies. May be repeated for a maximum of 12 credits.
Prerequisite: consent of instructor.

AUTO 290. ASE Certification Preparation
1 Credit (1)
This is the capstone course for the Automotive Technology Program and is a requirement for graduation. Consent of Instructor required. Restricted to: AUTO majors. Restricted to Community Colleges campuses

Learning Outcomes

1. write technical reports explaining customers complaint(s), specific component malfunction(s) and related problems to include repair procedures, specifications, parts and costs associated with each specific repair
2. determine, categorize and document component or systems malfunctions which will be discussed in class
3. adequately identify safety hazards associated with electrical, electronic, hydraulic, pneumatic and mechanical systems before participating in any lab project
4. use a systematic approach to identify, diagnose and repair new hydro, electrical and mechanical systems
5. identify all related parts and components before attempting to repair each system

6. clearly identify and understand the specific function of each component before these systems and subsystems are dismantled for repairs
7. demonstrate proficiency in locating, identifying and following procedures for repairs as outlined on the Mitchell and All-DATA computer information systems
8. retrieve all phases of automotive information needed to repair the following: Electrical and Electronics, Engine Repair, Engine Performance, Automatic transmissions, Heating And Air Conditioning Systems
9. demonstrate proficiency in the proper usage of on-board computer scanners used to identify and properly diagnose possible malfunction within a specific on-board computer system 1
10. demonstrate proficiency in the proper use of scanners, information and vehicle specifications to determine needed repairs 1
11. identify, evaluate, diagnosis and repair electrical, electronic and mechanical systems and subsystems

AUTO 295. Special Topics
1-6 Credits
Topics to be announced in the Schedule of Classes.