AUT - AUTO MECHANICS

AUT 100 Introduction to Automotive Service Operation and Shop Practices
This introductory course is designed to provide the student with knowledge and skill in automotive service operations and shop practices. The student will interact with various automotive service organizations, dealerships, and independent service and repair contractors. Proper handling, parts departments, job classifications, training for a career in the automotive service and repair industry, and other automotive business related topics will be addressed. This course presents instruction in automotive terminology, use of service manuals, diagnostic equipment, use of shop tools, hand tools, and power tools in relation to shop practices and safety. Accident prevention practices, first aid tools and equipment, and personal environmental safety practices and procedures will be stressed throughout the course. In addition, an overview of the automotive engines system, its major components, delivery units, preventive maintenance, and basic mathematics will be covered.
Upon successful completion of this course, students should be able to:
Demonstrate personal and environmental safety practices.
Apply basic first aid procedures.
Identify tool and equipment nomenclature.
Apply and utilize tool safety regulations.
Explain Occupational Safety and Health Act (OSHA).
Utilize service manuals/electronic media.
Identify all data informational systems.
Perform basic mathematical calculations.
Identify the major components of the automobile.
Perform calculations using the metric system.
Prerequisite: NONE New students should complete Placement Testing prior to registration. Visiting students may submit college transcript.
2 Credits1 Weekly Lecture Hour
2 Weekly Lab Hours

AUT 101 Automotive Electricity and Electronics
This course is designed to prepare the student to work in the field of electricity and electronics as it relates to the modern day automobile. The course covers concepts in basic electricity, electrical terms, electrical circuits, and electronic systems protection. The student will be introduced to various types of batteries such as deep cycle batteries and hybrid batteries, their design, maintenance, size, selection, factors affecting the battery's life, safety procedures, testing, charging, and jump-starting. Emphasis will be placed on the ignition system, its design, components, control circuits, testing, disassembly and assembly. The course is also designed to provide the student with a basic understanding of present and future developments in sophisticated automotive electronics. In addition, indicator systems, pollution control systems and other modern automotive accessory systems will be addressed.
Upon successful completion of this course, students should be able to:
Perform electronic pollution controls testing, service and repair requirements.
Identify basic electronic circuits used in the modern automobile.
Identify system defects and troubleshooting procedures.
Utilize various techniques to adjust electronic ignition systems.
Recognize electronic braking systems.
Test, service, and repair various systems according to requirements.
Identify indicators and gauges.
Repair power operated cruise control.
Install warning, security, and sound systems.
Identify electronic controlled trip computers, and digital indicator systems.
Troubleshoot warning and warning indicators.
Prerequisites: AUT 100.
4 Credits2 Weekly Lecture Hours
4 Weekly Lab Hours

AUT 102 Automotive Engines
This course is designed to provide the student with the fundamental theory, construction, inspection, measurement, performance, and identification of the automobile's engine. Integrating theory and practical application in the lab is stressed throughout the course. The course covers topics such as preparing the engine for removal, lifting, disassembly, assembly, and inspection, as well as identifying, diagnosing, and evaluating engine parts. The student will gain skill in analyzing defects and the proper process to administer specific maintenance requirements. In addition, the student will be exposed to concepts in cylinder block reconditioning, crankshaft inspection and measurements, piston rings inspection, renewal, and installation.
Upon successful completion of this course, students should be able to:
Prepare engines for removal.
Disassemble, inspect, and clean engine parts.
Install bearing, pistons, piston rings, and crankshaft.
Assemble the cylinder head.
Remove the camshaft.
Install timing components, gears chain, and belts.
Inspect and service oil pumps.
Inspect aluminum cylinder heads; combustion chamber, and intake exhaust valves.
Follow valves reconditioning guide for valve seats, and valve stem seals.
Adjust hydraulic and manual valve clearance.
Lubricate and test cooling system.
Inspect air induction system and exhaust system components.
Service turbochargers and superchargers.
Utilize torque wrench and its components.
Thread and repair gaskets and their sealing properties.
Use adhesives, sealant and other sealing materials.
Reassemble engine and install engine in the vehicle.
Perform crankshaft inspection measurements.
Prerequisites: AUT 100.
4 Credits2 Weekly Lecture Hours
4 Weekly Lab Hours

AUT 103 Brake Systems
This course is designed to introduce students to the principles of hydraulic brake systems and their components. The course will emphasize how to analyze and repair domestic and foreign brake systems to include shoe, disc, hydraulic, vacuum and air brake systems. Instruction will include principles of hydraulic brake systems, its components, hydraulic system safety switches and valves, master cylinder operation, as well as inspection, machining, fitting, and adjustments of brake systems. Measurements required for brakes, rotors, brake lining, and brake-bleeding procedures will be addressed. Mathematical calculation requirements and the use of digital readout units will be covered. In addition, diagnostic testing of disc brake components and functions, two and four wheel equipped disc brakes, general caliper inspection and service, rotor inspection and service, various antilock brake systems, ABS components and systems, automatic traction control and stability will be thoroughly presented.
Upon successful completion of this course, students should be able to:
Identify hydraulic brake systems.
Repair brake components and systems.
Perform inspection, measurement and machining procedures.
Diagnose, service and repair antilock brake systems and automated traction control.
Service and repair four-wheel disc brake systems.
Identify principles of hydraulic brake systems and components.
Identify drum and disc brake assemblies.
Diagnose and service brake drum and rotor components.
Perform rotor inspection service and measurements.
Diagnose and repair antilock brake systems for two wheel and four-wheel units.
Prerequisites: AUT 100.
4 Credits2 Weekly Lecture Hours
4 Weekly Lab Hours

AUT 114 Steering and Suspension
This course is designed as an introduction to tire descriptions, wheels, tire repairs, measurements, wheel run out, tires and wheels service, and wheel bearings. The course provides the student with methods of analyzing defects and the necessary preventive or corrective maintenance requirements. Tire wear patterns and remedies will be thoroughly covered. Emphasis will be placed on McPherson Strut Systems, independent suspension systems, general front suspension inspection, and repairs. Topics such as electronically controlled suspension, manual steering systems, power steering systems, electrically controlled power steering systems, and steering system diagnosis will be covered. Visual inspection, four-wheel steering systems, alignment geometry, pre-alignment inspection, wheel alignment equipment, and alignment machines will also be presented.
Upon successful completion of this course, students should be able to:
Identify tire descriptions and usage.
Perform service on tires and wheels, wheel bearings, front and rear from tapered to roller.
Identify tire wear patterns and remedies.
Repair frames, suspension system components, and McPherson Strut Systems.
Inspect and service front suspension components.
Repair rear, independent, semi-independent, and live-axle rear suspension systems.
Perform two- and four-wheel alignment procedures.
Utilize alignment machines.
Prerequisites: AUT 100.
4 Credits2 Weekly Lecture Hours
4 Weekly Lab Hours

AUT 115 Fuel I and II
This course introduces the student to gasoline and diesel fuels with emphasis on fuel performance, delivery systems, pumps, and fuel lines in major domestic and foreign automotive fuel systems. The course includes carburetor design, basic carburetor circuits, and various types of carburetors. It also covers fuel injection systems, fuel lines, and fuel pumps, detailed inspection processes, and fuel tanks. The course also includes a complete diagnostic troubleshooting process, and an overall factory adjustment procedure of all major carburetor and fuel injection systems.
Upon successful completion of this course, students should be able to:
Demonstrate safety in handling fuels.
Evaluate uses of alternative fuels.
Identify fuel delivery systems for gasoline and diesel engines.
Determine alcohol and/or water levels in fuel tests.
Identify fuel systems pressure, relief, and fuel filters.
Identify the sources of technical data for automotive fuel systems.
Discuss diesel fuel injection systems for passenger cars.
Operate and service hydraulic and mechanically controlled fuel injection systems.
Explain the operation/service of electronically controlled fuel injection systems.
Determine methods to analyze defects.
Identify the fuel injection systems defects.
Diagnose carburetor circuits and electronic control.
Service carburetors and their related components.
Evaluate basic carburetor designs, basic carburetor circuits, types of carburetors, updraft, side draft, and downdraft.
Identify manifold vacuum, ported vacuum, venturi vacuum and their relationship to fuel injection systems.
Prerequisites: AUT 100.
2 Credits1 Weekly Lecture Hour
2 Weekly Lab Hours

AUT 121 Engine Performance
This course is designed to provide the student with theory, design, construction, inspection, and service of the automotive engine. The purpose of the course is to review engine operation and performance, the creation of vacuum during engine operation, comparison of engine vacuum to low voltages use with vehicle engine management computer. Concepts such as computer programming, diagnosing, and troubleshooting internal circuit boards will be presented. The purpose and operation of critical sensors in fuel economy, emission control and electronic spark timing will also be presented. Catalytic converters, their purpose in controlling exhaust gas emission and the use of two or more O2 sensors will also be covered. Case studies of the vehicle engine, spark and fuel malfunctions, the use of scan tools, AC and DC test instruments, and dynamometer operation to simulate on-road conditions will be explored. Moreover, the use of OBD (On-Board Diagnostics) to determine malfunctions within the overall engine fuel and electronic management parameters will also be reviewed. Hands on skills to determine malfunctions in the operation of the modern vehicle in real life scenarios will be practiced.
Upon successful completion of this course, students should be able to:
Identify engine operation and performance, vacuums, and electronic devices.
Perform computer programming.
Process malfunction retrieval of diagnostic trouble codes.
Test sensors and activators performance.
Define the relationship of fuel management to electronic engine control.
Utilize scan tools.
Repair emission control and electronic spark timing.
Utilize exhaust dynamometer operation to simulate on-road conditions.
Recognize internal circuits malfunctions.
Identify results using two or more O2 sensors.
Define operation of exhaust analyzers and dynamometers.
Solve case studies describing malfunctions of engine parts.
Apply AC and DC test instruments.
Define OBD.
Determine malfunctions within the overall engine fuel and electronic management parameters.
Prerequisites: AUT 101 and AUT 102 and AUT 123 and AUT 151 and AUT 152.
3 Credits1 Weekly Lecture Hour
4 Weekly Lab Hours

AUT 123 Power Train Controls
This course is designed to expose the student to the design, service, and diagnosis of automotive computer power train controls in automotive transmissions. Shifting, transfer case shifting, four- wheel drive and all-wheel drive shifting as well as shift feel diagnostics, and linkage adjustments will be covered. Emphasis will be placed on diagnostic and troubleshooting malfunctions and diagnostic and troubleshooting electronically controlled transmission/transaxles. Hands-on experience will be gained by utilizing electronic meters to retrieve malfunction trouble codes from the vehicle's computer. Factory/aftermarket scanner tools will be utilized to determine or retrieve malfunctions trouble codes within the transmission/transaxle units.
Upon successful completion of this course, students should be able to:
Prepare a list of electronically controlled unit cases.
Diagnose and troubleshoot electronically controlled units.
Demonstrate electronically controlled 4-wheel drive and all-wheel drive units.
Service electronically controlled transfer case units.
Troubleshoot the unit's malfunctions.
Utilize factory/aftermarket scanner tools to retrieve malfunction trouble codes.
Disassemble, repair and replace electronic sensors.
Locate oil pressure controlled switches.
Reassemble electronic sensors and test for proper operation.
Prerequisites: AUT 100*.*
2 Credits1 Weekly Lecture Hour
2 Weekly Lab Hours

AUT 150 Air Conditioning
This course is designed to provide the student with theory and skill in the design, operation, diagnostic, repair, and service procedures of the automotive heating and air conditioning combinations, individual controls, and refrigerants used in air conditioning systems. Manual and automatic operations of systems, basic and advanced control systems, and computer controlled air conditioning systems will be discussed. In addition, temperature controls systems, refrigerant control systems, proper maintenance procedures, and recommendations will also be addressed. Topics such as electrical, electronic diagnosis, troubleshooting, retrofitting R-12 systems to R-134A, and utilizing proper antifreeze protection will also be covered.
Upon successful completion of this course, students should be able to:
Demonstrate safety and caution with refrigerants.
Obtain EPA (Environmental Protection Agency) certification.
Handle approved refrigerants.
Diagnose heating and air conditioning system failures.
Diagnose and repair electric and electronic systems.
Discharge, evacuate, and repair various systems.
Repair and change various systems.
Drain, flush and refill cooling systems.
Operate combustion and individual controls.
Identify refrigerants to be used in A/C systems.
Apply basic and advanced control systems.
Recommend maintenance procedures.
Operate manual and automatic systems.
Prerequisites: AUT 100*.*
2 Credits1 Weekly Lecture Hour
2 Weekly Lab Hours

AUT 151 Ignition Systems
This course is designed to provide the student with a foundation in theory and skill in the field of ignition systems. Basic, primary and secondary circuits, ignition timing, spark timing systems, and the components and operation of the ignition system will be discussed. Visual inspection of components, wiring, and no-start diagnosis and general ignition system testing as well as the scope and effects of incorrect ignition timing will be included. Theory and practical application in the laboratory will be stressed.
Upon successful completion of this course, students should be able to:
Define the purpose of the ignition system.
Demonstrate safety, caution and proper use of tools.
Install high voltage secondary wiring.
Diagnose and troubleshoot primary and secondary ignition systems.
Troubleshoot distributor equipped and direct sparks ignition systems.
Diagnose primary and secondary distributor service ignition control systems.

Diagnose and repair no start problems.
Adjust ignition timing on engines.
Prerequisites: AUT 100*. and AUT 101.*
2 Credits1 Weekly Lecture Hour
2 Weekly Lab Hours

AUT 152 Computer and Emissions Systems
This course is designed to provide the student with theory and skill in the design, repair, service, and testing procedures of emission systems, and as well as drivability problems. Electronic service precautions, computer outputs, primary sensors, monitoring capabilities, OBD (On-Board Diagnostics) systems and terms will be covered thoroughly. The use of various types of computers in diagnostic systems, such as retrieving trouble codes, diagnosing computer voltage supply, and ground wires will be presented. The student will also be prepared to test input sensors, actuator sensors, and variable resistor type sensors, generate sensors, and test various computer circuits in the modern day automobile. The legislative history of emission controls, pollutants, evaporative emission control systems, PVC emission control system, exhaust emission control system, EGR (Exhaust, Gas, and Recirculation) systems, catalytic converter systems, troubleshooting and diagnosing emission systems, and engine management by computer systems will be thoroughly covered.
Upon successful completion of this course, students should be able to:
Explain computer operation, circuits, and design.
Define OBD (On-Board Diagnostics) terms.
Utilize testing tools to retrieve malfunction codes from the computer.
Identify the importance of emission controls and emission control procedures.
Interpret electronic service precautions.
Perform basic diagnosis.
Explain computer outputs and actuators.
Retrieve trouble codes from various types of computers.
Test input sensors and actuator sensors.
Explain exhaust emission control system.
Define EGR (Exhaust, Gas and Recirculation) systems Troubleshoot and diagnose emission systems.
Maintain control of emission and engine management by the computer.
Prerequisites: AUT 100*.*
3 Credits2 Weekly Lecture Hours
2 Weekly Lab Hours

AUT 153 Automotive Manual Transmission/Transaxle and Chassis
This course is designed to provide the student with knowledge and skill in manual transmission/transaxle and clutch units, used to move vehicles from a stop to full speed. It includes internal unit designs; power flows, gearing theory, internal nomenclature overdrive, and gear ratio explanation. Disassembly, assembly, and removal of the transmission/transaxle, as well as inspection of the internal components will be covered. Service and replacement of CV joints and front wheel drive will also be included. Conventional and limited slip differentials provide the student with knowledge and skill in the operation and function of the clutch.
Upon successful completion of this course, students should be able to:
Demonstrate safety in disassembly, removal, and assembly of units in the vehicle.
Inspect components in a vehicle.
Install units in the vehicle.
Explain gear ratio.
Apply gearing theory.
Inspect and measure internal components.
Replace internal components.
Demonstrate how varied gear combinations move a vehicle to highway speeds.
Diagnose gearing and clutch problems during unit's operation.
Differentiate between manual transmissions and manual transaxles.
Identify clutch components and determine replacement.
Prerequisites: AUT 100*. and AUT 101.*
3 Credits1 Weekly Lecture Hour
4 Weekly Lab Hours

AUT 190 Automotive Internship (1 credit)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 60 hour internship will earn 1 college credit for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
Prerequisite:To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
1 Credit

AUT 194 Automotive Internship (2 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 120 hour internship will earn 2 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
Prerequisite:To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
2 Credits

AUT 199 Automotive Internship (3 credits)
College-Sponsored Experiential Learning (CSEL) is designed to integrate on-the-job learning experiences with classroom studies. These experiences are structured either to explore career options or to prepare for a specific occupation. Students participating in the Cooperative Education and Internship Program gain college credit and are graded for their learning/work experience by the appropriate faculty. Students participating in this 180 hour internship will earn 3 college credits for this experience. Upon successful completion of this hands-on work experience, the student should be able to satisfy instructionally selected competencies from those below according to the number of credits to be awarded.
Upon successful completion of this course, students should be able to:
Explain three program-related concepts that have been applied during the work experience.
Describe the ways that technology is utilized in the work experience.
Analyze the culture of the host organization.
Analyze an operational process within the work experience.
Demonstrate how assigned tasks depend on successful communication.
Describe how time and activity are managed to meet work-imposed deadlines.
Describe an instance where problem-solving skills were needed to analyze a situation in the work experience.
Formulate a self-assessment for career growth and personal satisfaction.
Satisfy the competencies of the chosen CSEL placement (to be developed in consultation with the CSEL instructor).
Work closely with a faculty mentor in the student's program/major to complete a project which articulates how the experience helps the student achieve program outcomes.
Prerequisite:To be eligible for an internship, students must: Have completed a minimum of 18 or more credits within the last 5 years. Have begun course work in their major (at least 9 credits). Have an overall grade point average (GPA) of 2.5. Obtain a written recommendation by a DCCC faculty within the discipline of the internship. Submit a current resume to the Office of Student Employment Services.
3 Credits

AUT 200 Automotive Automatic Transmission/Transaxle
This course is designed to provide the student with theory and skill in the design, construction, inspection, repair, and diagnostic testing of the automatic transmission/transaxle. The student will be prepared to perform diagnostic procedures during the evaluation of the component's operation to determine if minor or major repairs are required to bring the automatic transmission/transaxle units back to manufacturer's specifications. In addition, processes to disassemble, measure, inspect, and re-assemble automatic transmission/transaxle units correctly will be stressed. Electronic controls, hydraulic systems, locking and unlocking hubs, and operational modes will be discussed. Emphasis will be placed on servicing four-wheel drive and all-wheel drive systems; transmission clutches, automatic transmission /transaxles maintenance, oil, and filter change procedures will also be covered. Hands-on procedures will be stressed throughout the course.
Upon successful completion of this course, students should be able to:
Demonstrate cautions and safety.
Evaluate torque converters, bearings, bushings, and thrust washers.
Disassemble, measure, and assemble units.
Measure and install new parts as required.
Differentiate between 4-wheel drive and all-wheel drive.
Evaluate transfer cases, their operation, service, and maintenance.
Service 4-wheel drive and all-wheel drive vehicles.
Identify hydraulic systems.
Lock and unlock hubs.
Change transmission fluids and determine their proper usage in various manufacturers' units.
Apply proper procedures for oil and filter change.
Remove, overhaul and re-install transmission/transaxle in vehicles.
Adjust units back to manufacturer's specifications.
Prerequisites: AUT 100.
4 Credits2 Weekly Lecture Hours
4 Weekly Lab Hours

AUT 201 Automotive Chassis and Security Systems
This course is designed to expose the student to the chassis and many security systems used on today's modern vehicles. This course will prepare the student to diagnose, wire, troubleshoot, remove, and install components in a safe and efficient manner. In addition, topics such as air bag restraint systems; front, side, and roof units restraint systems; conventional seat belts and roofline slider belts will be addressed. Moreover, radio and speaker installations, automatic vehicle leveling systems, and proper wiring for anti-theft device installation systems will also be covered.
Upon successful completion of this course, students should be able to:
Test chassis and security systems.
Define air bag restraint systems.
Remove and service air bag systems.
Prevent deployment of air bag systems.
Demonstrate precaution during the disconnecting of air bags for servicing.
Repair restraint systems using conventional seat belts and roofline slider belts.
Inspect belt webbing and anchor locations.
Install belt webbing and anchor locations.
Recognize delayed lighting and running lamps.
Install and repair automatic locks, security and anti-theft devices.
Perform appropriate wiring for anti-theft device installation.
Install radios, CD tape players, and speakers systems.
Replace and repair electronic heat grids on rear windows.
Utilize automatic vehicle leveling systems.
Utilize the wiring diagram and computer.
Install automatic built in security systems.
Adjust chassis.
Troubleshoot chassis operation.
Prerequisites: AUT 100 *and AUT 151.*
2 Credits1 Weekly Lecture Hour
2 Weekly Lab Hours