

# AUTO MECHANICS (AUTMC)

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## Courses

### **AUTMC-100 (G1) SAFETY AND GENERAL AUTOMOTIVE MAINTENANCE AND REPAIR 6 Credits**

(G1) Safety and General Automotive Maintenance and Repair is an introductory course required of all Automotive Technology majors. This course is the prerequisite to all other Automotive Technology courses and places emphasis on shop safety and accepted safety practices, OSHA regulations and instructions on the handling of hazardous materials related to the automotive industry. Students will also learn the safe operation and use of tools, shop equipment and vehicle hoists. Students are required to pass the Safety examination before participating in the automotive lab. Coursework then focuses on preparing students for the 8 areas of emphasis in our ASE/NATEF Master accredited program courses. Basic theory and service of these 8 automotive systems, (ASE designation A1 - A8), are covered. Basic skills and accepted practice of mechanical applications, use of information systems, survey of industry related careers, laws governing the automotive service industry, and environmental impacts related to the automotive industry will be introduced. This course aligns with ASE/NATEF (G1) standards. Students will have the opportunity to certify in an Entry-Level ASE certification exam in Maintenance and Light Repair (G1). Successful completion of AUTMC-100 course, with a grade of C or higher is a prerequisite for all other Automotive Technology courses offered at LCSC. For Automotive Technology Majors only, must have a clean driving record, (must be insurable on State Insurance policy), and ability to bring or fund required tools for course. Students are required to either bring an approved starter tool kit of professional grade automotive hand tools or plan on purchasing these tools by the end of week 2. Instructors, Division Chair, Division Dean and Advising Center all have current copies of the recommended tool list and can advise on cost of initial tool investment.

### **AUTMC-102 (A6) ELECTRICAL/ELECTRONIC SYSTEMS 6 Credits**

(A6) Electrical/Electronic Systems is an ASE Master Automotive Service Technology accredited course which is a prerequisite and foundational course for all other ASE courses offered at Lewis Clark State College. It consists of theory in automotive electrical with emphasis in AC and DC currents, Ohm's law related to series and parallel circuit theory, magnetism, induction, starting and charging systems, circuit testing practices, wiring diagrams and symbols, and basic automotive electronic theory. Students will participate in labs structured to test circuits, identify circuit and component faults, and learn to perform services and repairs of typical automotive electrical problems. Students will learn the use of electrical diagnostic equipment and how to read and use electrical diagrams with service instructions and materials. Theory learned in the classroom will be applied in live lab opportunities. Students must be enrolled as an Automotive Technology Major, have a clean driving record, (insurable on State Insurance policy). Students are required to successfully pass the (A6) Electrical/Electronic Systems ASE Entry-Level exam and earn a C or higher in this course to receive credit for program graduation. Pre-requisite: AUTMC-100 with a grade of 'C' or higher.

### **AUTMC-103 (A3) MANUAL DRIVE TRAIN AND AXLES 6 Credits**

This is an ASE Master Automotive Service Technology accredited course offering an in-depth study of the operation of manual transmissions, transfer cases, differentials, and four-wheel-drive systems with an emphasis on the diagnostic process that a technician would use to isolate faults. This course includes theory, diagnosis, service, and repair of clutch assemblies, hydraulic actuators, gears, evaluating bearing wear and setting bearing preload. Each student will complete a manual transmission clutch and flywheel replacement. Additionally, each student will remove, rebuild, and reinstall a differential. Students will be required to write estimates for repair work performed in the lab and are expected to participate verbally in class discussions. Some lab projects will require students to work in small groups. Students are expected to write short answer essays to complete homework assignments and will be quizzed with ASE certification exam style questions in preparation for the ASE A3 test. Students must earn a C or higher and are required to successfully pass the (A3) Manual Drive Train and Axles ASE Entry-Level examination to receive credit for program graduation. Pre-requisite: AUTMC-100 with a grade of 'C' or higher.

### **AUTMC-105 (A1) ENGINE REPAIR 6 Credits**

AUTMC-105 (A1) Engine Repair is an ASE Master Automotive Service Technology accredited course which offers an in-depth study of automotive gasoline and light diesel engines. The course includes theory, diagnosis, service, and repair in the following areas: general engine diagnosis, service and repair procedures for cylinder head and valve train, engine block and reciprocating assembly, lubrication function and requirements, and cooling systems. This course includes AERA (Automotive Engine Rebuilders Association) materials and certification examinations as well as ASE Entry-Level certification. Lab experience will focus on implementation of industry standards and practices in the repair/rebuilding of engines. Our students will have the opportunity to remove and reinstall engines in a service environment. They will participate in the machining and building of engines, repair and diagnosis of failed engines, and learn building concepts related to not only factory standards but also concepts in entry-level high-performance engine building applications. This course is designed to prepare students for the ASE A1 Engine Repair certification exam. Students are required to successfully pass the (A1) Engine Repair ASE Entry-Level examination, two AERA examinations, and earn a C or higher grade to receive credit for program graduation. The course requires students to be enrolled as an Automotive Technology Major, have a clean driving record, (insurable on State Insurance policy). Pre-requisites: MTHPT-103 or MTHPT-137, AUTMC-100, AUTMC-102 and AUTMC-212 with a grade of C or higher.

**AUTMC-115 (A4) STEERING AND SUSPENSION 6 Credits**

AUTMC-115 (A4) Steering and Suspension is an ASE Master Automotive Service Technology accredited course which offers an in-depth study of service of steering and suspension components and includes accepted practices in service and adjustment of alignment angles, service and replacement of steering links and related components, diagnosis and repair of suspension components. Upon completion of this course students will be competent in performing alignments and performing wheel and tire-related service work. Live lab assignments include in depth participation in performing vehicle alignments, service and repair of steering and suspensions components, diagnosis of handling and steering issues, basic concepts of ADAS (Advanced Drivers Assistance Systems) and prepare students for working with and diagnosing entry level ADAS issues. This course is designed to prepare students for the ASE (A4) Steering and Suspension entry level certification exam. Students are required to successfully pass the (A4) Steering and Suspension ASE Entry-Level examination and earn a C or higher to receive credit for program graduation. The course requires students to be enrolled as an Automotive Technology Major, have a clean driving record, (insurable on State Insurance policy). Pre-requisites: MTHPT-103 or MTHPT-137, AUTMC-100, AUTMC-102, AUTMC-212 completed with a grade of C or higher.

**AUTMC-190 DIRECTED STUDY IN AUTO MECHANICS TECHNOLOGY 1-6 Credits**

Individually prescribed instruction and self-study to meet specific training objectives. May be repeated. Credits earned may not directly apply to degree or certificate.

**AUTMC-200 (A5) BRAKES (A7) HEATING, VENTILATION, AND AIR CONDITIONING 6 Credits**

This is a two-part course that covers the ASE Master Automotive Service Technology accredited course requirements for both A5 and A7. Brake systems will be studied in-depth, including hydraulic brake circuits, parking brake systems, anti-lock brakes, service of brake rotors and drums, and traction control system service and repair. Students will participate in labs structured to experience accepted machining practices for brake rotors and drums, how to diagnose and service brake wearing components, how to service brake hydraulic, cable, and electric braking systems. Students will learn approved practices for diagnosing and servicing electronic brake and traction control system faults. The A7 HVAC section of this course covers service and repair of air conditioning and heating systems, including preparation for the Mobile Air Conditioning Service (MACS) examination. Industry and EPA standards for handling and servicing automotive refrigerants, HVAC system components, and basic concepts of computerized HVAC controls will be covered. HVAC lab experience focuses on diagnosis and service of automotive air conditioning systems and practices that are compliant with EPA standards. Students will learn how to diagnose and service heating and ventilation systems and the electronic devices that control automotive HVAC operation. This course is designed to prepare students for the ASE (A5) Brakes and the (A7) Heating, Ventilation and Air Conditioning certification exam. Students are required to successfully pass the (A5) Brakes and (A7) Heating, Ventilation and Air Conditioning ASE Entry-Level examinations and earn a C or higher to receive credit for program graduation. Pre-requisite: AUTMC-100 and AUTMC-102 with a grade of C or higher.

**AUTMC-209 (A2) AUTOMATIC TRANSMISSION AND TRANSAXLE 6 Credits**

This is an ASE Master Automotive Service Technology accredited course which offers an in-depth study of automatic transmissions and transaxles, with emphasis on the diagnostic process that a technician working on today's most common vehicles would use to isolate transmission faults. This course includes theory, diagnosis, service, and repair of transmission/transaxle hydraulic and electrical/electronic circuits, service of hard mechanical and wearing components, gaskets, seals, bearings, gears, and torque converters. Each student will remove, disassemble, inspect, reassemble, and reinstall an automatic transmission. Students will be required to write estimates for repair work performed in the lab and are expected to participate verbally in class discussions. Most lab projects will require students to work in groups of two. Students are expected to write short answer essays to complete homework assignments and will be quizzed with ASE certification exam style questions in preparation for the ASE (A2) Automatic Transmission and Transaxles certification exam. Students are required to pass the ASE Entrance Level examination for (A2) Automatic Transmission and Transaxle and pass the course with a C or higher for graduation requirements. This course is for Automotive Technology Majors only, who have completed AUTMC-100 and AUTMC-102 with a C or higher grades.

**AUTMC-212 (A8) ENGINE PERFORMANCE 6 Credits**

(A8) Engine Performance is an ASE Master Automotive Service Technology accredited course which is a foundational course for many advanced ASE accredited courses. The materials cover concepts in engine combustion, emissions, engine performance, fuel and ignition systems, diagnostic strategies and the use of related tools including DSO's (digital storage oscilloscopes) and scan tools. Students will be introduced to onboard computer networks and basic testing practices/standards for these electronic systems. This class is preparatory for the (L1) Advanced Engine Performance course. Lab experiences will include the operation of our chassis and engine dynamometers in conjunction with experiments in emissions, economy, and engine performance. Students will learn how to competently operate diagnostic scan tools and DSOs to help guide them to proper diagnostic outcomes in vehicles with engine performance issues. Students must be enrolled as an Automotive Technology Major, have a clean driving record, (insurable on State Insurance policy), successfully completed AUTMC-100 and AUTMC-102 with a grade of C or higher. Students are required to successfully pass the ASE Entry-Level (A8) Engine Performance examination and earn a C or higher to receive credit for program graduation.

**AUTMC-225 (L1) ADVANCED ENGINE PERFORMANCE 6 Credits**

(L1) Advanced Engine Performance is a continuation of (A8) AUTMC-212 Engine Performance with emphasis in the areas of advanced diagnostic strategies utilizing both engine and chassis dynamometers. Students will study components that impact emissions, economy, standard performance and hi-performance engines. The course will help prepare students for their (L1) Advanced Engine Performance ASE examination. This is accomplished through the study of final emissions, economy, and the power produced by modern gasoline engines, with focus on gasoline engines only. This course is designed to acquaint the student with environmental laws and the impact of vehicle emissions on our environment. Students will study, in depth, the relationship of emissions, economy and power output of today's modern gasoline engines and will learn to utilize test equipment for the evaluation of exhaust gas content in relation to emissions, economy and power. The importance of fuel quality and grades will be discussed and studied through experimentation of varied grades of gasoline fuels. Course study will include methods of performing modifications to fuel, ignition, and computer-controlled systems, and include tuning for hi-performance applications with emphasis on how these modifications impact emissions, economy, and power. Students will be required to participate in several experiments which will require engine building combinations to achieve varied outcomes which will impact final emissions, economy and power. Students will perform experiments utilizing our chassis and engine dynamometers to prove concepts and perform research experiments. Pre-requisites: Students must have successfully completed the following courses with a "C" or higher, AUTMC-100, AUTMC-102, AUTMC-105, AUTMC-212. Completion of this course with a grade of "C" or higher is required for the course to be applied toward graduation from the Auto Mechanics program.

**AUTMC-227 (P2) PARTS SPECIALIST 3 Credits**

(P2) Parts Specialist is designed to prepare students for the ASE (P2) Parts Specialist certification exam. This course is for students wanting to learn/experience the role of an automotive counter person. Students will learn how to order parts from many sources including aftermarket suppliers, original equipment manufacturers, wholesale supply chains, internet retailers, and used component sources. Students will learn inventory management skills and common practices for shipping and receiving goods. Particular attention will be paid to billing, cost of goods and margin calculations, labor rates, and customer communication skills. AUTMC-227 may be substituted for math requirements for students seeking a certificate in Auto Mechanics. AUTMC-227 cannot be substituted for the AAS mathematics requirement. Completion of course with a grade of "C" or higher is required for course credit to be applied for graduation with a certificate in Automotive Technology. AUTMC-227 is for Automotive Technology Majors only. Pre-requisite: AUTMC-100 with a C or higher is required.

**AUTMC-250 (A9) LIGHT VEHICLE DIESEL ENGINES 6 Credits**

(A9) Light Vehicle Diesel Engines is an ASE Master Automotive Service Technology accredited course. This course is an advanced course building on the theory and concepts of several other prerequisite courses. Study will be focused on today's light duty diesel engines in cars and light trucks. Particular attention will be given to diesel fuel systems, emissions, and diagnostic strategies for diesel engine performance. This course is an extension of the AUTMC-212 course in (A8) Engine Performance with dedicated emphasis on strategies for diagnosing, servicing, and repairing light diesel engine issues. Students will learn of EPA standards and laws governing over the road light diesels. In our live lab students will use diagnostic tools to analyze and diagnose diesel operation, perform services and repairs on light diesel vehicles. Students will use diagnostic equipment previously learned but applied to diesel systems. Students will prepare for the ASE (A9) Light Vehicle Diesel Engines certification exam. Students are required to pass the ASE Entrance Level examination (A9) Light Vehicle Diesel Engines with a C or higher and earn a C or higher for graduation requirements. This course is for Automotive Technology Majors only. Pre-requisites: MTHPT-103 or MTHPT-137, AUTMC-100, AUTMC-102, AUTMC-105 and AUTMC-212 with grades C or higher.

**AUTMC-260 (L3) LIGHT DUTY HYBRID / ELECTRIC VEHICLES 6 Credits**

This course expands on the concepts covered in (A6) Automotive Electrical / Electronics and (A2) Automatic Transmission / Transaxle courses. This offering prepares students for hybrid and electric vehicle high voltage system service. An in-depth study of safety requirements, procedures, and equipment required when working with high voltage is provided. Students will be introduced to the common designs and structures that hybrid/EV systems employ to operate safely and efficiently. Students will learn how to diagnose, service, and repair high voltage battery packs, on-board charging systems, charge cables, AC and DC circuits, inverters, converters, cooling systems/thermal management, and electric drive motors. An overview of charging and discharging principles for proper maintenance and upkeep of hybrid/EV batteries will be covered. Students will prepare for the ASE (L3) Light Duty Hybrid/Electric Vehicle certification exam. This course is for Automotive Technology Majors only, who have completed AUTMC-100, AUTMC-102, and AUTMC-209 with grades of C or higher. Students must earn a C or higher grade for course to be applied toward graduation.

**AUTMC-270 (C1) AUTOMOBILE SERVICE CONSULTANT 6 Credits**

AUTMC-270 (C1) course is for students that would like to manage or own an automotive repair facility. Automotive service is a very complex, ever-changing business. The products, technology and needs of customers change regularly. At the same time there are new competitors constantly entering the market with new approaches to cornering the market. This class will start with basic principles and skills necessary to be a service consultant and continue on with foundational principles to owning an automotive repair facility. Students must be Auto Mechanics Major, are required to have earned a C or higher grade in MTHPT 103 or MTHPT 137 and AUTMC-100, have a clean driving record for State insurance requirements. Students must earn a C or higher in this course to meet graduation requirements in the Auto Mechanics program.

**AUTMC-290 DIRECTED STUDY IN AUTO MECHANICS TECHNOLOGY 1-6 Credits**

Directed Study in Auto Mechanics Technology.

**AUTMC-294 INTERNSHIP IN AUTO MECHANICS TECHNOLOGY 6 Credits**

AUTMC-294 Internship in Auto Mechanics Technology is a critical component in preparing students for industry. The experience will include on the job experiences under the supervision of your advisor and industry mentor. Students are required to keep a weekly journal/log of their experience, and submit a weekly report. Only open to students enrolled in the Auto Mechanics program, sophomore standing or higher, and have a 2.0 grade point or higher in required Auto Mechanics core course work, and must have instructor's permission. The student will receive a Pass/Fail grade. Course is 1 - 6 credits depending on length of internship, (45 hours per credit).

**AUTMC-394 IN: AUTO REPAIR 12 Credits**

Individually prescribed instruction and self-study to meet specific training objectives. May be repeated.