

Luna Community College

Automotive Technology Curriculum Profile

2012-2015

Automotive Technology

Certificate

The program prepares students for the automotive industry. It provides students with the skills needed for a job as an entry-level line technician. It covers the automobile in every area such as chassis systems, electrical systems, fuel systems, climate control systems, drive train systems, and engine repair and engine performance. This program also provides upgrades in skills for technicians already working in the automotive industry. Demonstration of appropriate automotive skills to the faculty advisor is required.

The program follows the Automotive Service Excellence (ASE) and National Automotive Technician Education Foundation (NATEF) curriculum standards. Upon completion of this program a student will receive a certificate and may be eligible to take the Automotive Service Excellence (ASE) certification test.

Completion of this certificate can be applied toward the Associate of Applied Science Degree in Vocational/Technical Studies.

Institutional Proficiency Requirements

In addition to the courses listed below for this program of study, students must also complete institutional proficiencies of ENG095, MATH075 and READ095 that are outlined on page 77 of the LCC 2012-2015 Catalog to meet all graduation requirements.

Certificate Requirements -

Minimum of 53 Credit Hours

Program Requirements (51 hours)

AUTO100 Automotive Fundamentals	4 credits
AUTO104 Electrical and Electronic Systems I	5 credits
AUTO106 Engine Performance I	5 credits
AUTO108 Manual Transmission and Drivetrain	4 credits
AUTO120 Engine Repair	5 credits
AUTO124 Heating and Air Conditioning	4 credits
AUTO126 Engine Performance II	5 credits
AUTO128 Automatic Transmissions and Drivetrain	5 credits
AUTO135 Brakes	4 credits
AUTO137 Electrical and Electronic Systems II	5 credits
AUTO154 Steering and Suspension	4 credits
AUTO295 Automotive Technology Capstone	1 credits

Approved Electives (2 hours)

AUTO101 General Automotive Service	2 credits
AUTO161 Introduction to Diesel Mechanics	4 credits

CRT100	Introduction to Collision Repair	3 credits
MGMT218	Principles of Small Business Management	4 credits
SMET105	Computer Use for Technology	3 credits
WLDG105	Introduction to Welding	3 credits

AUTO100: Automotive Fundamentals (4 credits)

This course provides the foundation of automotive technology with basic engine theory and operation. Includes lubrication and cooling systems, standards for safety and shop operations, also covers tools and supplies used in the industry. Maintenance procedures and schedules are also covered along with diagnostic concepts. Use of information systems, both printed and computer based, is covered. Industry opportunities and trends are covered along with customer service and professionalism. Practical applications are covered.

Learning Objectives:

- Students will take and pass safety tests, students will learn and comprehend the colors pertaining to OSHA.
- Explain how to properly use equipment in the Automotive shop.
- Identify the different subsystems in the Automobile.
- Identify ASE (Automotive Service Excellence) tests needed to become certified in any of the 8 areas.
- Identify hand tools, and power tools used and how to properly use them.
- Describe how to properly fill out work orders and how to use the different types of diagnostic charts.
- Recognize electrical and electronic circuits in the Automobile
- Identify bolts, and know how to make and repair threads.
- Properly check fluids, know the importance of maintenance, and how to perform an oil change.

Learning Outcomes

- Students will take and pass all safety tests with 100%
- Students will know the components of subsystems of a vehicle
- Students will use hand tools and power tools properly
- A jumper wire will be made by the students, and will know how to use the jumper wire
- Students will be able to identify bolts and know how to make threads in metal for the bolts

AUTO101: General Automotive Service (2 credits)

This course will include the functions and use of automobile components, procedures and methods of preventive maintenance, lubrication, servicing, wheel bearings, tire rotation,

servicing oil, fuel, filters and battery. Practical applications are covered with an emphasis on safety. Corequisite: [AUTO100](#).

Learning Objectives:

- Explain and pass 5 safety tests and do job 1 in workbook.
- Describe how to perform an oil change.
- Perform a leak inspection of fluids on a vehicle.
- Describe how to change, inspect, and or replace hoses and or a thermostat on a vehicle.
- Identify how to inspect and or replace shock absorbers.
- Explain how to rotate and balance tires properly.

Learning Outcomes

- Properly perform an oil change
- Students will properly balance tires
- Students will change shock absorbers and struts
- Will change an alternator and belts
- Will replace radiator hoses and thermostat

AUTO104: Electrical and Electronic Systems I (5 credits)

This course covers basic automotive electricity, electronics fundamentals, theory and applications for automotive circuits. This course will also cover diagnosis and repair of electrical systems and schematic study. Battery, starting and charging systems are specifically studied in this course. Corequisite: [AUTO100](#).

Learning Objectives:

- Will know how to compare voltage, current, and resistance. Will also know how to perform fundamental electrical tests.
- Visually inspect battery, perform basic battery test, safety practices of battery removal, installation, and proper procedure for jumping a battery.
- Describe the safety practices that should be followed when diagnosing, testing, and repairing a starter motor. Adjust a neutral safety switch.
- Inspect, diagnose, remove, and repair charging system components properly and safely.
- Properly inspect, diagnose, and repair ignition system components.

Learning Outcomes

- Students will know how to use a multimeter to perform basic electrical tests
- Will perform a battery inspection and procedures for battery replacement
- Will properly disassemble and reassemble a starter
- Will properly remove and replace an alternator
- Will know how to test electrical components

AUTO106: Engine Performance I (5 credits)

This course will cover engine performance diagnosis and repair of systems related to drive ability, including carburetion, ignition systems, fuel systems and engine mechanicals. The course will also cover diagnostic equipment usage and procedure based strategies. Corequisite: [AUTO100](#).

Learning Objectives:

- Know the safe and proper way of inspecting, testing, and repair of the fuel system components. Know the difference between mechanical and electric fuel pumps and proper and safe procedure for replacing.
- List and explain the different classifications and advantages of fuel injection systems.
- List and explain and identify the basic parts of the carburetor.
- Describe the differences between gasoline and diesel engines.
- Describe basic exhaust system operation and repairs.

Learning Outcomes

- Perform proper testing procedures on fuel systems
- Properly identify electronic fuel pumps and mechanical fuel pumps
- Properly remove and install fuel pumps mechanical and electric
- Properly removal and installation fuel filters
- Diagnose, remove, and install fuel injectors

AUTO108: Manual Transmission and Drivetrain (4 credits)

This course covers theory and operation of the manual transmission along with disassembly and assembly procedures. Clutch operation along with service and repair, differential theory, operation, disassembly and assembly procedures, shafts, along with axles, driveshafts, transaxles and transfer cases will also be covered. Corequisite: [AUTO100](#).

Learning Objectives:

- Identify and describe the parts of a modern drive shaft assembly.
- Explain the basic operation of a transfer case.
- Describe the operation of a differential.
- Explain the basic service and repair of a differential assembly.
- Explain the operation of a manual transaxle assembly.
- Identify the parts of constant velocity drive axles.

Learning Outcomes

- Students will replace u-joints on a drive shaft
- Properly disassemble and re-assemble a manual transmission

- Properly remove and re-install a transfer-case
- Properly remove and install a seal
- Proper removal and installation of constant velocity drive axles

AUTO120: Engine Repair (5 credits)

This course will cover operation and construction of internal combustion engines (ICE). Removal and installation procedures, engine identification, disassembly, inspection, measurement and assembly procedures, along with in-vehicle engine repairs, diagnostic routines and practices. Corequisite: [AUTO100](#).

Learning Objectives:

- Identify and describe the use of common measuring tools.
- Explain the basic function of the major parts of an automotive engine.
- Describe basic automotive engine classifications.
- Explain the construction of a timing gear, timing chain, and timing belt assembly.
- Summarize how to inspect, remove, and disassemble an engine.

Learning Outcomes

- Students will disassemble and reassemble an engine
- Students will be able to identify engine components
- Properly use valve cutting machine and valve seat machine
- Properly identify different camshaft drives
- Proper method for checking the surface of a cylinder head

AUTO124: Heating and Air Conditioning (4 credits)

This course covers principles of heating and air conditioning systems with an emphasis on diagnosis. Identification is covered along with service and repair of both manual and automatic systems. Climate control systems with computer controls are also covered. Corequisite: [AUTO100](#).

Learning Objectives:

- Explain the operation and construction of major cooling system components.
- Check the major parts of a cooling system for proper operation.
- Explain the principles of refrigeration.
- Explain the basic function and construction of each major part of a typical heating and air conditioning system.
- Describe and demonstrate the general procedures for evacuating and charging an air conditioning system.

Learning Outcomes

- Students will be able to identify Heating and Air Conditioning components
- Will be able to identify two common refrigerants used in automobiles
- Will be able to use identifier
- Will be able to use recovery/recycling machine
- Will take and pass ASE(Automotive Service Excellence) test, certification dependant on students submission of test

AUTO126: Engine Performance II (5 credits)

This course will cover basic electricity review, automotive computer systems history, usage, strategy, testing and diagnosis. Emission control systems, fuel injection, distributor less ignition and other performance systems will also be covered. Diagnostics of On-Board Diagnostics (OBD) I and II will have an emphasis on procedure and symptomatic based strategies.

Prerequisite: [AUTO106](#).

Learning Objectives:

- Explain input sensor and output device classification and operation.
- Summarize where computers, control modules, sensors, and actuators are typically located.
- Describe the operating principles of emission control systems.
- Explain typical causes of engine performance problems.
- Explain service operations commonly performed during a tune-up.

Learning Outcomes

- Students will perform a compression test
- Properly test sensors
- Properly remove and replace sensors
- Properly perform an engine tune-up
- Will know how to retrieve codes and properly use information obtained

AUTO128: Automatic Transmissions and Drivetrain (5 credits)

This course will cover automatic transmission/transaxle fundamentals including torque converter operations, planetary gear operations, hydraulics principles, valve body operations and transmission power flow. Automatic transmission/transaxle in-vehicle service and repair as well as removal, disassembly, assembly and installation will be covered. Corequisite: [AUTO100](#).

Learning Objectives:

- Identify and describe the function and operation of the major parts of an automatic transmission.
- Make basic external adjustments on an automatic transmission.
- Explain the function of a drive shaft.

- Adjust an automatic transaxle shift linkage.
- Diagnose, remove, and disassemble an automatic transaxle.

Learning Outcomes

- Students will properly diagnose an automatic transmission/transaxle
- Proper removal and re-installation of automatic transmission/transaxle
- Proper procedure for rebuilding transmissions
- Know proper use of tools used for rebuilding transmissions
- Know how to properly make adjustments needed

AUTO135: Brakes (4 credits)

This course provides a foundation to the automotive brake system, including the fundamentals of brake systems. The course includes theory, inspecting and diagnosis practices with an emphasis on safety, along with repair procedures and inspection on specific equipment operation.

Corequisite: [AUTO100](#).

Learning Objectives:

- Identify the parts of driving and non-driving hub and wheel bearing assemblies.
- Explain service procedures for wheel bearings.
- Explain and identify the major parts of an automotive brake system.
- Explain how to service a disc and drum brake assembly.
- Identify and explain the major parts of a typical anti-lock brake system.

Learning Outcomes

- Students will know how to measure disc and drums
- Proper method for resurfacing discs and drums
- Will perform brake service on disc brakes on drum brakes
- Will know proper procedure for brake adjustment
- Will know how to properly diagnose brake problems

AUTO137: Electrical and Electronic Systems II (5 credits)

This course will be a review of basic electricity and electronics leading into more advanced lighting systems, instrument panel, horn, windshield wiper/washer and other complex accessories found in the modern automobile. Prerequisite: [AUTO104](#).

Learning Objectives:

- Compare ignition coil, spark plug, and distributor design variations.
- Demonstrate how to replace or repair ignition system parts.
- Explain the operating principles of automotive light, wiper, and horn systems.
- Diagnose basic sound system and power lock systems.

- Summarize the operation of alternate power sources for vehicles.

Learning Outcomes

- Students will be able to identify electrical and electronic components
- Will be able to diagnose and replace electrical and electronic components
- Will be able to make proper electrical repairs
- Will know how to use the soldering gun
- Will know how to use scan tool to diagnose electrical and electronic components

AUTO154: Steering and Suspension (4 credits)

This course will provide a foundation to the automotive chassis system, including the fundamentals of the chassis system. The course includes theory, inspecting and diagnosing practices with an emphasis on safety, along with the repair procedures and specific equipment operation. Alignment procedures will also be covered. Corequisite: [AUTO100](#).

Learning Objectives:

- Identify the parts of a tire and wheel.
- Identify and describe the major parts of a suspension system.
- Diagnose problems relating to a suspension system.
- Compare the differences between a linkage steering and a rack and pinion steering system.
- Describe caster, camber, and toe adjustment.

Learning Outcomes

- Students will know how to properly mount and dismount tires
- Will know how to properly inspect and replace shocks and struts
- Will know how to properly inspect and replace suspension components
- Will know how to inspect and replace a rack and pinion steering
- Will know how to perform an alignment

AUTO161: Introduction to Diesel Mechanics (4 credits)

This course will cover the study of diesel engines, basic systems or diesel engines such as mechanical structure, cooling, lubrications, fuel, storage, troubleshooting, and service are emphasized. Students will also study diagnosis and operating principles of diesel engines by use of diagrams, testing instruments and live engines.

Learning Objectives:

- Discuss shop and personal safety.
- Identify tools used in repair of diesel engines.

- Demonstrate basic diesel engine fundamentals.
- Discuss internal components and function.
- Describe difference from gasoline engines and similarities.
- Show the function of lubrication, fuel, and cooling systems.
- Demonstrate troubleshooting possible problems with diesel engines.
- Discuss the overall function and operation of the diesel engine.
- Show proper procedures in disassembly, reassembly, repair, and identification of diesel components.

AUTO295: Automotive Technology Capstone (1 credits)

This course is for students in their final semester of the Automotive Technology Program. In this course the student will prepare for and take a comprehensive examination. Information/content will come from the core curriculum/program requirements. Study guides, pre-tests and group sessions will be utilized. Students must also submit a portfolio consisting of coursework completed throughout the core program. A sample Automotive Service Excellence (ASE) test will also be taken. Prerequisites: [AUTO100](#), [AUTO104](#), [AUTO106](#), [AUTO135](#), [AUTO154](#) and instructor approval.

Learning Objectives:

- List the most common automotive careers.
- Explain the tasks completed by each type of auto technician.
- Describe the type of skills needed to be an auto technician.
- List the traits employers look for in their employees.
- Explain how to find job openings in the automotive field.

Learning Outcomes

- Will take and pass 8 ASE(Automotive Service Excellence) practice tests
- Will make a resume
- Will perform one job in each section of the ASE areas out of the job sheets book
- Will create a portfolio
- Will practice interview skills

CRT100: Introduction to Collision Repair (3 credits)

This is an introductory course covering the basics of Auto Body Repair including safety orientation, hand tools, power tools, equipment, basic metal straightening, and surface preparation.

Learning Objectives:

- Students will learn Body Shop safety

- Students will learn to repair dents properly using body fillers.
- Students will learn to properly use the tools of the trade.
- Students will learn about metal preparation.
- Students will learn how to properly straighten metal.
- Students will learn about proper sanding techniques.
- Students will learn about the different grits of sand papers, wet or dry, grinding discs, etc.
- Students will learn the basics of a collision, whether to determine if it's direct or indirect damage.

Course Learning Outcomes (Competencies)

- Students will learn to repair minor dents and to perform proper surface preparation
- Master proper usage of the tools of the trade, tool safety, body fillers and plastic repair.
- Understand the proper techniques of sanding and stripping techniques.

MGMT218: Principles of Small Business Management (4 credits)

This course provides students with extensive knowledge of the steps needed to start and run a small business. Topics include; entrepreneurial opportunities, preparing the business plan, marketing and managing small business operations, financial and administrative controls, and social and legal environment.

Course Competencies: Upon successful completion of this course students will be able to:

- Demonstrate the importance of a business plan for small businesses;
- Demonstrate and utilize all elements in a business plan;
- Identify business opportunities in starting, operating, and maintaining a business, and
- Recognize the importance of customer service

SMET105: Computer Use for Technology (3 credits)

This course is the study of the fundamentals of computer technology software used in engineering technology fields. Emphasis will be placed on technical and scientific computer applications. Topics to be covered will include an introduction to computer concepts, Windows, Microsoft Word, Excel, Access, and PowerPoint, and other specific software applications used to interface various engineering technologies fields.

Course Objectives:

- The objective of the course is to provide students with the computer basics for success in the STEM disciplines. Students will become proficient at basic Microsoft programs and will be introduced to AutoCAD software.

Learning Outcomes: upon completion of the course with a grade of “C” (70%) or better, the student will be able to:

- Demonstrate a knowledge of the course content through quizzes, projects, and exams
- Apply the concepts learned in class to unit projects
- Demonstrate a working knowledge of both Microsoft and AutoCAD software

- Demonstrate a working knowledge of hardware and components

WLDG105: Introduction to Welding (3 credits)

This course teaches the fundamentals in the welding processes, shop orientation, and shop safety. Start with oxy/acetylene cutting and welding, and advance into basic MIG,TIG, and stick welding. Plasma cutting will be introduced. Welding will be tested in the flat, horizontal, vertical and overhead positions. Practical applications are covered and pipe welding will be introduced.

Learning Outcomes:

1. Identify some of the common hazards in welding.
2. Explain and identify proper personal protection used in welding.
3. Describe how to avoid welding fumes.
4. Explain some of the causes of welding accidents.
5. Identify and explain uses for material data safety sheets
6. Explain safety techniques for storing and handling bottles.
7. Explain how avoid electrical shock while welding.
8. Identify and explain the use of oxy/fuel cutting equipment.
9. Set up oxy/fuel equipment.
10. Light and adjust an oxy/fuel torch.
11. Proper shut down of bottles.
12. Change cylinders
13. Perform oxy/fuel cutting and welding procedures.

Assessment

Luna Community College defines assessment as a process that will lead to the improvement of student learning. The process must follow four steps as illustrated below.

LCC Assessment Plan

All course offerings, including degree and certificate programs, at Luna Community College are required to follow the four-step assessment process. They include:

1. A list of expected learning outcomes
2. Assessment tools that directly measure those learning outcomes
3. The results of the data, and
4. How the data will be used to improve student learning

Academic Departments at Luna Community College are required to participate in semester “Improving Student Learning” assessment reporting and Student Learning Outcomes Assessment (SLOA) Committee presentations. Every semester, academic departments focus on specific learning outcomes with a targeted student population. Faculty are selected to participate in SLOA; selected faculty participate in developing assessment methods and procedures for their particular course or courses. The faculty give oral presentations at the end of the semester and information gathered is disseminated among SLOA members, faculty and staff. The purpose is to provide a baseline for future improvements.

Visit our web site at www.luna.edu to review LCC’s Improving Student Learning (ISL) reports. LCC also abides by the New Mexico state competencies for general education. 22



LUNA COMMUNITY COLLEGE
Standard “Minimal” Requirements for Course Syllabus

Course	course title and other course information including meeting times, dates, room number, credits, semester, prerequisites and/or co-requisites
Faculty	information about the instructor and his or her contact information (e.g., phone number and email). List time and day of office hours for full time faculty
Course Description	use catalog description
Expectations of Students	What do you expect from your students? For example, description of students’ responsibilities in the learning process; how you hope the students will approach the course subject/content; take responsibility for their learning; the amount of study time expected in the course, and suggestions on how to succeed in the course.
Course Learning Outcomes (Competencies)	this section will include a list of skills or techniques students will develop from the course. This list will consist of a <u>minimum of four to six quantifiable statements</u> about what students will be able to do after completing the course.
New Mexico CORE Competencies	If teaching a CORE course, the State HED competencies must be stated (e.g., Communications, Mathematics, Laboratory Science, Social & Behavioral Sciences, Humanities & Fine Arts).
Methods of Measuring Learning Outcomes (Competencies)	What tools are used to measure student success based on the learning outcomes?

Evaluation

Indicate how the student will earn a particular grade, such as information about assignments including types of assignments, nature of exams (e.g., take home, open book, in-class) due dates, grading criteria and so forth.

Course Schedule

Add a tentative schedule indicating the course content that will be covered throughout the course (e.g., eight week or sixteen week schedule).

Policies

Include policies such as attendance, academic responsibilities, late assignments, missed exams, cell phones, etc.

Add a statement that indicates: for additional student information, refer to the 2012-2015 Student Handbook

Grading Standard

Refer to page 37 of the LCC 2012-2015 Catalog

Textbook(s)

Name of required textbooks(s) and any recommended materials. Include ISBN number(s)

Important Dates

List important dates such as last day to withdraw from the course, holidays, add/drop, midterm, final exam week, spring break and other important dates.

ADA Statement

Add a statement regarding accommodations for students with disabilities

Syllabus Revisions or Changes

Add a statement that indicates the syllabus is subject to change

Internet Courses (non-proctored)

Use the following statement: LCC will ensure firm student identification for examinations through the use of username and password for non proctored exams. As an on-line student, you are responsible for keeping your username and password secure. Your username and password should not be given out as you are responsible for

all assessment, assignments, and on-line communications. Any academic dishonesty/plagiarism will not be tolerated and is grounds for disciplinary actions. [Please refer to page 6 of the LCC 2012-2015 Catalog]