

# AUTOMOTIVE TECHNOLOGY

## Contact Information

### Division

Business and Technology

### Dean

Susan Lucyga (Interim)

### Associate Dean

Darlene Jackson

### Division Office

B 3, Rocklin Campus

## Overview

The Automotive Technology Program is supported by the Central Valley New Car Dealership Association (CVNCDA), is a member of Professional Automotive Training Centers (PATC) and has a Memorandum of Understanding (MOU) with Nissan of North America. All full-time automotive instructors are Master ASE Certified or above. The Automotive Technology Program is Automotive Service Excellence (ASE) certified in the following areas: Engine Repair, Automatic Transmission/Transaxles, Manual Drivetrains and Axles, Suspension/Steering, Brakes, Electric/Electronic Systems, Heating/Air Conditioning and Engine Performance.

The Automotive Technology Curriculum is designed to prepare students to become competent technicians and gain employment in the automotive industry at the completion of the program and to upgrade skills of those already in the field.

## Automotive Technology Advisory Committee

- Dave Burkhard, Instructor, San Juan High School
- Robert Butler, Owner, Pacific Auto, Auburn
- Bill Cardwell, Car Care Center, Sacramento
- Lynn Cardwell, Car Care Center, Sacramento
- Art Coppock (Retired), Snap-on Tools, Sacramento
- Vic Delius, Service Manager, Weaver Chevrolet, Alta
- Russ French, Fleet Operations Supervisor, City of Rocklin
- Bill Happ, Woodcreek High School, Roseville
- Steve Ledbetter, Emeritus Professor, Sierra College
- David Lewis, Engineer, Department of Consumer Affairs, Engineering and Technology Research, Sacramento
- Tom Ley, Service Manager, Future Nissan, Roseville
- Mark Means, Instructor, Woodcreek High School, Roseville
- Michelle Oberg, Bureau of Automotive Repair, Citrus Heights
- Dick Panciera, Service Manager (Retired), Reliable Pontiac and Cadillac, Roseville
- John Panelli (Retired), Sierra College Automotive, Colfax
- Alan Rowley, Technician, Monroe Transmission
- Scott Ruskauff, Owner, Back to Life Auto, Lincoln
- Greg Sahr, Technician, Duncan's Auto Service
- John Scalero, Snap-on Equipment
- Thomas Serpico, Service Manager, Future Nissan
- Vince Wisniewski, Snap-on Tools

## Degrees/Certificates

### Associate Degree

- Automotive Analysis (p. 1)

### Certificates of Achievement

- Air Conditioning and Body Electrical (p. 2)
- Alignment and Brake (p. 2)
- Automatic Transmission (p. 2)
- Automotive Engine Machining (p. 2)
- Emission and Driveability Tune-Up (p. 2)
- Master Automotive Technician (p. 3)
- Powertrain (p. 3)

### Skills Certificate

- Entry Level Automotive Service and Repair (p. 3)

## Automotive Analysis

### AA or AS Degree

Successful completion of the curriculum in Automotive Analysis qualifies students for entry-level positions in the various areas of automotive technology and provides them with an overview for selecting specific areas for further training and education. Students must fulfill the following major requirements with grades of "C" or better, complete a minimum of 60 degree-applicable semester units (12 of which must be completed at Sierra College) with a grade point average of at least 2.0 and complete one of the following three general education patterns:

- Sierra College Associate Degree Requirements (<http://catalog.sierracollege.edu/student-resources/general-education/associate-degree-requirements>);
- California State University General Education Breadth (CSU GE) (<http://catalog.sierracollege.edu/student-resources/general-education/california-state-university-general-education-breadth-requirements>) pattern;
- Intersegmental General Education Transfer Curriculum (IGETC) (<http://catalog.sierracollege.edu/student-resources/general-education/intersegmental-general-education-transfer-curriculum-igetc>).

### Required Courses

AUTO 0001	Automotive Data Acquisition	0.5
AUTO 0061	Vehicle and Engine Analyzing	4
AUTO 0064	Hydraulic and Brake Systems	4
AUTO 0068A	Basic Automatic Transmissions	4
AUTO 0071A	Automotive Electrical Systems	4
AUTO 0079	Suspension and Wheel Alignment	4
AUTO 0150	Introduction to Automotive Technology Profession	0.5

### Select 4 units from the following:

AUTO 0058	Introduction to Hybrid and Electric Vehicle Technology	
AUTO 0066A	Engine Reconditioning	
AUTO 0069	Automotive Air Conditioning and Heating	
AUTO 0075	Automotive Electronics	

AUTO 0080	Automotive Powertrains Manual Transmissions	
Total Units		25
<b>Recommended Electives</b>		
AUTO 0095	Internship in Automotive Technology	0.5-4
BUS 0020	Introduction to Business	3
BUS 0100	Management Concepts and Applications	3

## Certificates of Achievement

The Automotive Technology certificate program is designed to qualify students for specialized positions in automotive repair and related industries and to upgrade the skills of technicians already in the field. The program also includes the Master Automotive Technician Certificate, which certifies competence in all areas of conventional automotive repair and maintenance.

Certificate patterns consist of course concentration in specific areas, plus study in relevant areas such as Introductory Welding for Metalworking (WELD 0015). General education courses are not required. Specialized certificates require 18 to 36 units of course work, while the Master Automotive Technician Certificate requires 58.5 units. A certificate is designed to provide career technical skills; it is not equivalent to an associate degree.

### LICENSES:

- Automotive Emission Control
- Automotive Lighting Systems
- Automotive Brake Systems

The Automotive Technology program offers courses designed for mechanics who want to apply for a new license, or renew a license, in the areas of emission control, lighting and brake systems. See AUTO 0031 and AUTO 0064.

## Air Conditioning and Body Electrical

### Certificate of Achievement

#### Required Courses

AUTO 0001	Automotive Data Acquisition	0.5
AUTO 0061	Vehicle and Engine Analyzing	4
AUTO 0069	Automotive Air Conditioning and Heating	4
AUTO 0071A	Automotive Electrical Systems	4
AUTO 0075	Automotive Electronics	4
AUTO 0150	Introduction to Automotive Technology Profession	0.5
<b>Select 2 units from the following:</b>		2
AUTO 0060	Skill and Speed Development	
AUTO 0095	Internship in Automotive Technology	
Total Units		19

## Alignment and Brake

### Certificate of Achievement

#### Required Courses

AUTO 0001	Automotive Data Acquisition	0.5
AUTO 0060	Skill and Speed Development	1
AUTO 0064	Hydraulic and Brake Systems	4

AUTO 0071A	Automotive Electrical Systems	4
AUTO 0079	Suspension and Wheel Alignment	4
AUTO 0150	Introduction to Automotive Technology Profession	0.5
WELD 0015	Introductory Welding for Metalworking	2
<b>Select 3-4 units from the following:</b>		3-4
AUTO 0028	Independent Study (up to 2 units)	
AUTO 0095	Internship in Automotive Technology (up to 2 units)	
BUS 0140	Small Business Management	
Total Units		19-20

## Automatic Transmission

### Certificate of Achievement

#### Required Courses

AUTO 0001	Automotive Data Acquisition	0.5
AUTO 0060	Skill and Speed Development	1
AUTO 0068A	Basic Automatic Transmissions	4
AUTO 0071A	Automotive Electrical Systems	4
AUTO 0080	Automotive Powertrains Manual Transmissions	4
AUTO 0150	Introduction to Automotive Technology Profession	0.5
WELD 0015	Introductory Welding for Metalworking	2
<b>Select 3-4 units from the following:</b>		3-4
AUTO 0028	Independent Study (up to 2 units)	
AUTO 0095	Internship in Automotive Technology (up to 2 units)	
BUS 0140	Small Business Management	
Total Units		19-20

## Automotive Engine Machining

### Certificate of Achievement

#### Required Courses

AUTO 0001	Automotive Data Acquisition	0.5
AUTO 0060	Skill and Speed Development	1
AUTO 0066A	Engine Reconditioning	4
AUTO 0066B	Engine Reconditioning	4
AUTO 0150	Introduction to Automotive Technology Profession	0.5
WELD 0015	Introductory Welding for Metalworking	2
<b>Select 6-7 units from the following:</b>		6-7
AUTO 0028	Independent Study (up to 2 units)	
AUTO 0095	Internship in Automotive Technology (up to 4 units)	
WELD 0040	Wire Feed Welding Processes - Career Path	
or WELD 0050	Gas Tungsten Arc Welding (TIG) - Career Path	
Total Units		18-19

## Emission and Driveability Tune-Up

### Certificate of Achievement

#### Required Courses

AUTO 0001	Automotive Data Acquisition	0.5
AUTO 0060	Skill and Speed Development	1

or AUTO 0095	Internship in Automotive Technology	
AUTO 0061	Vehicle and Engine Analyzing	4
AUTO 0062A	Engine Fuel System Principles and Controls	4
AUTO 0062B	Computer Controlled Carburetion and Fuel Injection	4
AUTO 0063	Advanced Engine Performance Diagnosis	4
AUTO 0069	Automotive Air Conditioning and Heating	4
AUTO 0071A	Automotive Electrical Systems	4
AUTO 0075	Automotive Electronics	4
AUTO 0150	Introduction to Automotive Technology Profession	0.5
<b>Select one of the following:</b>		0-4.5
AUTO 0031	Automotive Emission Control Systems (OR)	
Completion of BAR Smog Check Inspection Training (Level 1) Certificate		
<b>Select one of the following:</b>		0-1.5
AUTO 0034	Advanced BAR Smog Check Inspection Training (Level 2) (OR)	
Possession of California Smog Certificate License		
Total Units		30-36

## Master Automotive Technician

### Certificate of Achievement

#### Required Courses

AUTO 0001	Automotive Data Acquisition	0.5
AUTO 0031	Automotive Emission Control Systems	4.5
AUTO 0061	Vehicle and Engine Analyzing	4
AUTO 0062A	Engine Fuel System Principles and Controls	4
AUTO 0063	Advanced Engine Performance Diagnosis	4
AUTO 0064	Hydraulic and Brake Systems	4
AUTO 0066A	Engine Reconditioning	4
AUTO 0068A	Basic Automatic Transmissions	4
AUTO 0069	Automotive Air Conditioning and Heating	4
AUTO 0071A	Automotive Electrical Systems	4
AUTO 0079	Suspension and Wheel Alignment	4
AUTO 0080	Automotive Powertrains Manual Transmissions	4
AUTO 0150	Introduction to Automotive Technology Profession	0.5
WELD 0015	Introductory Welding for Metalworking	2
<b>Select 3 units from the following:</b>		3
AUTO 0060	Skill and Speed Development	
AUTO 0095	Internship in Automotive Technology	
<b>Select 8 units from the following:</b>		8
AUTO 0062B	Computer Controlled Carburetion and Fuel Injection	
AUTO 0066B	Engine Reconditioning	

AUTO 0075	Automotive Electronics	
Total Units		58.5

## Powertrain

### Certificate of Achievement

#### Required Courses

AUTO 0001	Automotive Data Acquisition	0.5
AUTO 0060	Skill and Speed Development	1
AUTO 0068A	Basic Automatic Transmissions	4
AUTO 0071A	Automotive Electrical Systems	4
AUTO 0080	Automotive Powertrains Manual Transmissions	4
AUTO 0150	Introduction to Automotive Technology Profession	0.5
WELD 0015	Introductory Welding for Metalworking	2
<b>Select 3-4 units from the following:</b>		3-4
AUTO 0028	Independent Study (up to 2 units)	
AUTO 0095	Internship in Automotive Technology (up to 2 units)	
BUS 0140	Small Business Management	
Total Units		19-20

## Entry Level Automotive Service and Repair

### Skills Certificate

Designed to give students the automotive service/repair knowledge and abilities to successfully enter the workforce as an entry level automotive service technician requiring minimal supervision. This skills certificate focuses on skills and knowledge needed to diagnose, service and repair automotive electrical, brake, suspension and steering. This is a specialty skills certificate designed to provide career technical skills to enter the automotive repair business; it is not equivalent to an associate degree.

#### Required Courses

AUTO 0001	Automotive Data Acquisition	0.5
AUTO 0064	Hydraulic and Brake Systems	4
AUTO 0071A	Automotive Electrical Systems	4
AUTO 0079	Suspension and Wheel Alignment	4
AUTO 0150	Introduction to Automotive Technology Profession	0.5
Total Units		13

## Courses

Understanding course descriptions (<http://catalog.sierracollege.edu/student-resources/course-information/understanding-course-descriptions>)

### AUTO 0001. Automotive Data Acquisition

*Units: 0.5*

Hours: 11 (7 lecture, 4 activity)

Retrieval and application of automotive service data from on-line technical data bases including ALLDATA and Mitchell on Demand, as well as other websites related to automotive service information, shop management systems and documentation. Recommended for all Automotive Program students during their first semester of study. (not transferable)

**AUTO 0028. Independent Study***Units: 1-3*

Designed for students interested in furthering their knowledge at an independent study level where no specific curriculum offering is currently available. Independent study might include, but is not limited to, research papers, special subject area projects, and research projects. See Independent Study page in catalog. (CSU)

**AUTO 0031. Automotive Emission Control Systems***Units: 4.5*

Hours: 81 lecture

Training for meeting BAR Level 1 towards inspector license (E0), fundamental knowledge of engine and emission control theory, design, and operation. Successful completion meets the first step of the Bureau of Automotive Repair (BAR) training requirements for inexperienced or minimally experienced candidates for the Smog Check Inspector license (E0). (not transferable)

**AUTO 0034. Advanced BAR Smog Check Inspection Training (Level 2)***Unit: 1.5*

Prerequisite: Completion of AUTO 31 with grade of "C" or better or equivalent as determined by instructor

Hours: 29 lecture

Provides students with the procedural knowledge, skills, and abilities needed to perform Smog Check inspections. Successful completion meets the BAR Level 2 training requirements necessary to take the California BAR Smog Check Inspector (E0) licensing examination. (not transferable)

**AUTO 0058. Introduction to Hybrid and Electric Vehicle Technology***Units: 4*

Advisory: Completion of AUTO 0071A with grade of "C" or better

Hours: 108 (54 lecture, 54 laboratory)

Designed for students with little or no formal background or training in the hybrid/electric vehicle field. Covers the theory and operation of hybrid and electric vehicle operation. Each of the major manufacturers' vehicles is discussed along with the safety and service procedures that apply to these vehicles. Hands-on activities include major service procedures and basic diagnostics on the most common hybrid and electric vehicles in the market. (CSU)

**AUTO 0059. Introduction to Automotive Service***Units: 4*

Hours: 108 (54 lecture, 54 laboratory)

Designed for students with little or no formal background or training in the automotive field. Shop safety, tool usage, and hazardous waste management are covered. Vehicle topics include: engine operation, lubrication, cooling, ignition, electrical, suspension, fuel systems, brakes, tires and drive train. (CSU)

**AUTO 0060. Skill and Speed Development***Units: 1-2*

Prerequisite: Completion of AUTO 1 and one of the following courses:

AUTO 64, 66A, 68A, or 71A with grades of "C" or better

Hours: 54 laboratory per unit

Designed to further develop skill, speed, and experience capabilities of automotive majors to meet industry diagnostic and repair performance expectations. Individual projects selected by students with the agreement and guidance of instructor. Required of all automotive majors and automotive certificate students in area of specialization. Materials fee. (not transferable)

**AUTO 0061. Vehicle and Engine Analyzing***Units: 4*

Hours: 108 (54 lecture, 54 laboratory)

Study of automotive engine theories and principles. Emphasis on construction, repair, and adjustment methods of engine systems and components on engine performance diagnostic analysis using the latest equipment and methods. Also covers generic on-board diagnostic second generation (OBD2) engine control. Preparation for ASE Certification exam. (not transferable)

**AUTO 0062A. Engine Fuel System Principles and Controls***Units: 4*

Hours: 108 (54 lecture, 54 laboratory)

Basic principles of engine air/fuel management to meet emission and fuel economy needs. Emphasis on basic circuitry and adjustment procedures. A study of the relationship of today's oxygenated blends, engine performance and fuel controls using computerized and non-computerized carburetion and fuel injection. Preparation for ASE Certification examination. (CSU)

**AUTO 0062B. Computer Controlled Carburetion and Fuel Injection***Units: 4*

Prerequisite: Completion of AUTO 61, 62A, and 71A with grades of "C" or better

Hours: 108 (54 lecture, 54 laboratory)

Applications, theory of operation, and service to electronic computer controlled carburetion, fuel injection, and emission control systems. Diagnosis and repair driveability and engine performance faults involving all types of low and high pressure electronic feedback fuel injection systems on modern low and zero emission vehicles. Preparation for ASE Certification exam and smog repair technician license exam. (not transferable)

**AUTO 0063. Advanced Engine Performance Diagnosis***Units: 4*

Prerequisite: Completion of AUTO 1 and 62B with grades of "C" or better

Hours: 108 (54 lecture, 54 laboratory)

BAR Specified Diagnostic and Repair Training. Study of engine performance, electrical/electronics, advanced level engine performance diagnosis. Preparation for BAR Smog Check Repair Technician E1 License and ASE Certification exam. Formerly BAR A6, A8, and L1 alternative courses. (not transferable)

**AUTO 0064. Hydraulic and Brake Systems***Units: 4*

Hours: 108 (54 lecture, 54 laboratory)

Application of industry standards and practices for the inspection, diagnosis, service, and repair of automotive and light truck braking systems. Theory of operation as well as service procedures for disc and drum brake systems, hydraulic systems, power-assist devices, and anti-lock brake systems. Prepares students for California State Brake Adjuster License and ASE Brake Certification exam. (CSU)

**AUTO 0066A. Engine Reconditioning***Units: 4*

Hours: 108 (54 lecture, 54 laboratory)

Introduction to the machines and measuring processes used in the reconditioning of automotive and light truck engines including: cylinder head re-surfacing, valve guide repair, valve re-facing, valve seat replacement and finishing by grinding as well as carbide forming bits. Precision measurement of parts with micrometers and dial bore gauges. Part cleaning and inspection processes including Magnaflux and penetrating dye. Preparation for ASE Certification A-1. (CSU)

**AUTO 0066B. Engine Reconditioning***Units: 4*

Prerequisite: Completion of AUTO 66A with grade of "C" or better

Hours: 108 (54 lecture, 54 laboratory)

Advanced engine repair course. Students required to completely rebuild one liquid-cooled automotive engine. Engine and parts to be supplied by the student; cost varies from \$300 to \$1,000 or more. Preparation for ASE Certification exam A-1. (CSU)

**AUTO 0068A. Basic Automatic Transmissions***Units: 4*

Hours: 108 (54 lecture, 54 laboratory)

Theory of operation as well as service and repair practices for automatic transmissions and transaxles. Topics include: hydraulic torque converters and pumps, planetary gear sets, clutches and bands, hydraulic systems and apply devices, and electronic controls. Emphasis on diagnosis, adjustment, service, and rebuilding of transmissions used on domestic and foreign automobiles. Testing on a transmission dynamometer. Preparation for ASE Certification exam A-2. (not transferable)

**AUTO 0069. Automotive Air Conditioning and Heating***Units: 4*

Hours: 108 (54 lecture, 54 laboratory)

Principles in automotive air conditioning and heating systems. Emphasis on theory, controls, diagnosis, service, repair, and installation. A study in heat transfer, with methods of troubleshooting and repair of live vehicle air conditioning and heating systems. Includes use of State and Federal approved recovery and recycling equipment. Required to obtain EPA Section 609 refrigerant training certificate. Preparation for ASE Certification examination. (CSU)

**AUTO 0071A. Automotive Electrical Systems***Units: 4*

Hours: 108 (54 lecture, 54 laboratory)

Study of the theory, testing, diagnosis, and service of common body and engine electrical circuits, including batteries, switching, fusing, relays, thermal timers, DC motors, alternator principles, series circuits, and parallel circuits. Live system failure diagnosis using voltmeters, ammeters, and ohmmeters. Preparation for ASE Certification exam. (CSU)

**AUTO 0075. Automotive Electronics***Units: 4*

Prerequisite: Completion of AUTO 71A with grade of "C" or better

Hours: 108 (54 lecture, 54 laboratory)

Advanced study in automotive electronics, Controller Area Network (CAN), and control systems; resistor, capacitor, inductor, diode, and transistor circuitry with application to solid state sensors, controllers, and actuators. In-depth study of electrical diagnostics using computer-based diagnostic equipment and digital storage oscilloscope. Preparation for ASE Certification examination. (CSU)

**AUTO 0079. Suspension and Wheel Alignment***Units: 4*

Formerly known as AUTO 77 and 78

Hours: 108 (54 lecture, 54 laboratory)

Principles of wheel alignment, steering and suspension systems and their components. Methods of measuring and adjusting alignment geometry for automobiles and light trucks including four wheel alignment. Identification and correction of damaged and worn steering components. Emphasis on analyzing the cause and correction of improper suspension and alignment conditions including conventional and strut-type suspension systems. Preparation for ASE Certification. (CSU)

**AUTO 0080. Automotive Powertrains Manual Transmissions***Units: 4*

Hours: 108 (54 lecture, 54 laboratory)

Theory of operation as well as service and repair procedures for automotive and light truck manual transmission and drive train systems. Topics include: diagnosis and overhaul techniques for manual transmissions/transaxles, drivelines, four-wheel-drive transfer cases, clutches, and differentials (including limited slip). Preparation for ASE Certification A-3 Manual Drive Train and Axles. (CSU)

**AUTO 0095. Internship in Automotive Technology***Units: 0.5-4*

Designed for advanced students to work in an area related to their educational or occupational goal. Provides new on-the-job technical training under the direction of a worksite supervisor, allowing students to expand knowledge and skills in the chosen field. Mandatory orientation session and faculty approval to determine eligibility. One unit of credit is equal to each 60 hours of non-paid work, or each 75 hours of paid work. Students may earn up to a total of 16 units in internship courses (any course numbered 95 and PDEV 94). (CSU-with unit limitation)

**AUTO 0150. Introduction to Automotive Technology Profession***Units: 0.5*

Hours: 9 lecture

Career exploration in the automotive technology industry. Includes orientation to the automotive technology program at Sierra College, employment opportunities, career pathways, educational planning for associate degree, certificate and transfer. Research on labor market and occupational information and development of an educational plan. (pass/no pass grading) (not transferable)

## Program Student Learning Outcomes (PSLOs)

- Develop industry required skills for students to gain automotive service entry level jobs such as lube technicians or technician aids.
- Provide courses for currently employed automotive service students to advance their skill and knowledge to be qualified for advanced placement job (journeyman).
- Support the automotive industry training needs by providing certification/license training courses.