



Automotive Systems Technology
Credential: Associate in Applied Science
Degree in Automotive Systems Technology
A60160

This curriculum prepares individuals for employment as automotive service technicians. It provides an introduction to automotive careers and enhances the student's awareness of having to meet the challenges of this fast and ever-changing field. Classroom and lab experiences integrate technical and academic course work. Emphasis is placed on theory, servicing and operation of brakes, electrical/electronic systems, engine performance, steering/suspension, automatic transmission/transaxles, engine repair, climate control, and manual drive trains.

Upon completion of this curriculum students should be prepared for ASE certification and be ready for full-time employment in dealerships and repair shops in the automotive service industry. Cooperative education opportunities may be available at some North Carolina Community Colleges.

Program Length: 5 semesters
 Career Pathway Options: Associate in Applied Science Degree in Automotive Systems Technology
 Program Sites: Lee Campus - Day Program

Course Requirements for Automotive Systems Technology Degree

A. General Education Courses (15/17 SHC)		C-L-SHC
ENG 110	Freshman Composition	3-0-3
	OR	
ENG 111	Expository Writing	3-0-3
	AND	
ENG 111A	Expository Writing Lab	0-2-1
ENG 114	Professional Research and Reporting	3-0-3
	OR	
ENG 116	Technical Report Writing	3-0-3
	Humanities/Fine Arts Elective	3-0-3
MAT 115	Mathematical Models	2-2-3
	Or	
PHY 121	Applied Physics I	3-2-4
	Social/Behavioral Science Elective	3-0-3
B. Required Major Core Courses (18 SHC)		
AUT 141	Suspension and Steering Systems	2-3-3
AUT 151	Brake Systems	2-3-3
AUT 161	Electrical Systems	4-3-5
AUT 181	Engine Performance I	2-3-3
AUT 183	Engine Performance II	2-6-4
C. Other Major Hours Required for Graduation (42/43 SHC)		
AUT 110	Intro to Auto Technology	2-2-3
AUT 114	Safety and Emissions	1-2-2
AUT 114A	Safety and Emissions Lab	0-2-1
AUT 116	Engine Repair	2-3-3
AUT 116A	Engine Repair Lab	0-3-1

AUT 141A	Suspension and Steering Lab	0-3-1
AUT 151A	Brake Systems Lab	0-3-1
AUT 163	Adv Automotive Electricity	2-2-3
AUT 163A	Adv Automotive Electricity Lab	0-3-1
AUT 171	Auto Climate Control	2-4-4
AUT 181A	Engine Performance Lab	0-3-1
AUT 212	Auto Shop Management	3-0-3
AUT 221	Auto Transm/Transaxles	2-3-3
AUT 221A	Auto Transm/Transaxles Lab	0-3-1
AUT 231	Manual Trans/Axles/Drtrains	2-3-3
AUT 231A	Manual Trans/Axles/Drtrains Lab	0-3-1
AUT 281	Advanced Engine Performance	2-2-3
AUT 283	Advanced Auto Electronics	2-2-3
CIS 111	Basic PC Literacy	1-2-2
	OR	
AUT186	PC Skills for Auto Techs	2-2-3
WLD 112	Basic Welding Processes	1-3-2

Total Semester Hours Credit required for graduation: 75/78

Semester Curriculum for Automotive Systems Technology Degree

1st Semester (Fall)		C-L-SHC
AUT 110	Intro into Auto Technology	2-2-3
AUT 141	Suspension & Steering Systems	2-3-3
AUT 141A	Suspension & Steering Systems Lab	0-3-1
AUT 161	Basic Auto Electricity	4-3-5
CIS 111	Basic PC Literacy	1-2-2
	OR	
AUT 186	PC Skills for Auto Techs	2-2-3
MAT 115	Mathematical Models	2-2-3
	Or	
PHY 121	Applied Physics I	<u>3-2-4</u>
		11/13-15-17/19
2nd Semester (Spring)		
AUT 151	Brake Systems	2-3-3
AUT 151A	Brake Systems Lab	0-3-1
AUT 163	Adv Auto Electricity	2-3-3
AUT 163A	Adv Auto Electricity Lab	0-3-1
AUT 181	Engine Performance I	2-3-3
AUT 181A	Engine Performance I Lab	0-3-1
ENG 110	Freshman Composition	3-0-3
	OR	
ENG 111	Expository Writing	3-0-3
	AND	
ENG 111A	Expository Writing Lab	<u>0-2-1</u>
		9-18/20-15/16
3rd Semester (Summer)		
AUT 114	Safety and Emissions	1-2-2
AUT 114A	Safety and Emissions Lab	0-2-1
AUT 171	Auto Climate Control	2-4-4
AUT 183	Engine Performance II	<u>2-6-4</u>
		5-14-11
4th Semester (Fall)		
AUT 116	Engine Repair	2-3-3
AUT 116A	Engine Repair Lab	0-3-1
AUT 212	Auto Shop Management	3-0-3
AUT 231	Manual Drive Train/Axles	2-3-3
AUT 231A	Manual Trans/Axles/Drtrains Lab	0-3-1
ENG 114	Professional Research and Reporting	3-0-3
	OR	
ENG 116	Technical Report Writing	3-0-3

WLD 112	Basic Welding Processes	1-3-2
		11-15-16
5th Semester (Spring)		
AUT 221	Auto Transm/Transaxles	2-3-3
AUT 221A	Auto Transm/Transaxles Lab	0-3-1
AUT 281	Advanced Engine Performance	2-2-3
AUT 283	Advanced Auto Electronics	2-2-3
	Humanities Elective	3-0-3
	Social Science Elective	3-0-3
		12-10-16
Total Semester Hours Credit: 75/78		

COURSE DESCRIPTIONS

AUT 110 Intro to Auto Technology 2-2-3

This course covers workplace safety, hazardous material and environmental regulations, use of hand tools, service information resources, basic concepts, systems, and terms of automotive technology. Topics include familiarization with vehicle systems along with identification and proper use of various automotive hand and power tools. Upon completion, students should be able to describe safety and environmental procedures, terms associated with automobiles, and identify and use basic tools and shop equipment.

AUT 114 Safety and Emissions 1-2-2

This course covers the laws, procedures, and specifications needed to perform a North Carolina State Safety and Emissions inspection. Topics include brake, steering and suspension, lighting, horn, windshield wiper, tire, mirrors, and emission control devices inspection. Upon completion, students should be able to perform complete and thorough North Carolina State Safety and Emissions inspections.

AUT 114A Safety and Emissions Lab 0-2-1

Corequisite: AUT 114

This course is an optional lab that allows students to enhance their understanding of North Carolina State Emissions Inspection failures. Topics include evaporative, positive crankcase ventilation, exhaust gas recirculation and exhaust emission systems operation, including catalytic converter failure diagnosis. Upon completion, students should be able to employ diagnostic strategies to repair vehicle emissions failures resulting from North Carolina State Emissions inspection.

AUT 116 Engine Repair 1-3-2

This course covers the theory, construction, inspection, diagnosis, and repair of internal combustion engines and related systems. Topics include fundamental operating principles of engines and diagnosis, inspection, adjustment, and repair of automotive engines using appropriate service information. Upon completion, students should be able to perform basic diagnosis, measurement and repair of automotive engines using appropriate tools, equipment, procedures, and service information.

AUT 116A Engine Repair Lab 0-3-1

Corequisite: AUT 116

This course is an optional lab to be used as an alternative to co-op placement in meeting the NATEF standards for total hours. Topics include diagnosis, inspection, adjustment, and repair of automotive engines using appropriate service information. Upon completion, students should be able to perform basic diagnosis, measurement and repair of automotive engines using appropriate tools, equipment, procedures, and service information.

AUT 141 Suspension and Steering Systems 2-4-4

This course covers principles of operation, types, and diagnosis/repair of suspension and steering systems to include steering geometry. Topics include manual and power steering systems and standard and electronically controlled suspension and steering systems. Upon completion, students should be able to service and repair steering and suspension components, check and adjust alignment angles, repair tires, and balance wheels.

AUT 141A Suspension & Steering Lab 0-3-1

Corequisite: AUT 141

This course is an optional lab to be used as an alternative to co-op placement in meeting the NATEF standards for total hours. Topics include manual and power steering systems and standard and electronically controlled suspension and steering systems. Upon completion, students should be able to service and repair steering and suspension components, check and adjust alignment angles, repair tires, and balance wheels.

AUT 151 Brake Systems 2-2-3

This course covers principles of operation and types, diagnosis, service, and repair of brake systems. Topics include drum and disc brakes involving hydraulic, vacuum boost, hydra-boost, electrically powered boost, and anti-lock and parking brake systems. Upon completion, students should be able to diagnose, service, and repair various automotive braking systems.

AUT 151A Brake Systems Lab 0-3-1

Corequisites: AUT 151

This course is an optional lab to be used as an alternative to co-op placement in meeting the NATEF standards for total hours. Topics include drum and disc brakes involving hydraulic, vacuum-boost, hydra-boost, electrically powered boost, and anti-lock, parking brake systems and emerging brake system technologies. Upon completion, students should be able to diagnose, service, and repair various automotive braking systems.

AUT 161 Basic Auto Electricity 4-3-5

This course covers basic electrical theory and wiring diagrams, test equipment, and diagnosis/repair/replacement of batteries, starters, alternators, and basic electrical accessories. Topics include diagnosis and repair of battery, starting, charging, lighting, and basic accessory systems problems. Upon completion, students should be able to diagnose, test, and repair the basic electrical components of an automobile.

AUT 163 Adv Auto Electricity 2-3-3

Corequisites: AUT 161

This course covers electronic theory, wiring diagrams, test equipment, and diagnosis, repair, and replacement of electronics, lighting, gauges, horn, wiper, accessories, and body modules. Topics include networking and module communication, circuit construction, wiring diagrams, circuit testing, and troubleshooting. Upon completion, students should be able to properly use wiring diagrams, diagnose, test, and repair wiring, lighting, gauges, accessories, modules, and electronic concerns.

AUT 163A Adv Auto Electricity Lab 0-3-1

Corequisite: AUT 163

This course is an optional lab to be used as an alternative to co-op placement in meeting the NATEF standards for total hours. Topics include networking and module communication, circuit construction, wiring diagrams, circuit testing, troubleshooting and emerging electrical/electronic systems technologies. Upon completion, students should be able to properly use wiring diagrams, diagnose,

test, and repair wiring, lighting, gauges, accessories, modules, and electronic concerns.

AUT 171 Auto Climate Control 2-4-4

This course covers the theory of refrigeration and heating, electrical/electronic/pneumatic controls, and diagnosis/repair of climate control systems. Topics include diagnosis and repair of climate control components and systems, recovery/recycling of refrigerants, and safety and environmental regulations. Upon completion, students should be able to describe the operation, diagnose, and safely service climate control systems using appropriate tools, equipment, and service information.

AUT 181 Engine Performance I 2-3-3

This course covers the introduction, theory of operation, and basic diagnostic procedures required to restore engine performance to vehicles equipped with complex engine control systems. Topics include an overview of engine operation, ignition components and systems, fuel delivery, injection components and systems, and emission control devices. Upon completion, students should be able to describe operation and diagnose/repair basic ignition, fuel, and emission-related drivability problems using appropriate test equipment/service information.

AUT 181A Engine Performance I Lab 0-3-1

Corequisite: AUT 181

This course is an optional lab to be used as an alternative to co-op placement in meeting the NATEF standards for total hours. Topics include overviews of engine operation, ignition components and systems, fuel delivery, injection components and systems, and emission control devices and emerging engine performance technologies. Upon completion, students should be able to describe operation and diagnose/repair basic ignition, fuel and emission related drivability problems using appropriate test equipment/service information.

AUT 183 Engine Performance II 2-6-4

Prerequisite: AUT 181

This course covers the study of the electric engine control systems, the diagnostic process used to locate engine performance concerns and procedures used to restore normal operation. Topics will include currently used fuels and fuel systems, exhaust gas analysis, emission control components and systems, OBD II (on-board diagnostics) and inter-related electrical/electronic systems. Upon completion, students should be able to diagnose and repair complex engine performance concerns using appropriate test equipment and service information.

AUT 186 PC skills for Auto Techs 2-2-3

This course introduces students to personal computer literacy and Internet literacy with an emphasis on the automotive service industry. Topics include service information systems, management systems, computer-based systems, and PC based diagnostic equipment. Upon completion, students should be able to access information pertaining to automotive technology and perform word processing.

AUT 212 Auto Shop Management 3-0-3

This course covers the principles of management essential to decision-making, communication, authority, and leadership. Topics include shop supervision, shop organization, customer relations, cost effectiveness, and work place ethics. Upon completion, students should be able to describe basic automotive shop operation from a management standpoint.

AUT 221 Auto Transm/Transaxles 2-3-3

This course covers operation, diagnosis, service, and repair of automatic transmissions/transaxles. Topics include hydraulic, pneumatic, mechanical, and electrical/electronic operation of automatic drive trains and the use of appropriate service tools and equipment. Upon completion, students should be able to explain operational theory and diagnose and repair automatic drive trains.

AUT 221A Auto Transm/Transax Lab 0-3-1

Corequisite: AUT 221

This course is an optional lab to be used as an alternative to co-op placement in meeting the NATEF standards for total hours. Topics include hydraulic, pneumatic, mechanical, and electrical/electronic operation of automatic drive trains and the use of appropriate service tools and equipment. Upon completion, students should be able to diagnose and repair automatic drive trains.

AUT 231 Man Trans/Axles/Drtrains 2-3-3

This course covers the operation, diagnosis, and repair of manual transmissions/transaxles, clutches, driveshafts, axles, and final drives. Topics include theory of torque, power flow, and manual drive train service and repair using appropriate service information, tools, and equipment. Upon completion, students should be able to explain operational theory and diagnose and repair manual drive trains.

AUT 231A Man Trans/Axles/Drtrains Lab 0-3-1

Corequisites: AUT 231

This course is an optional lab for the program that needs to meet NATEF hour standards but does not have a co-op component in the program. Topics include manual drive train diagnosis, service and repair using appropriate service information, tools, and equipment. Upon completion, students should be able to diagnose and repair manual drive trains.

AUT 281 Advanced Engine Performance 2-2-3

This course utilizes service information and specialized test equipment to diagnose and repair power train control systems. Topics include computerized ignition, fuel and emission systems, related diagnostic tools and equipment, data communication networks, and service information. Upon completion, students should be able to perform diagnosis and repair.

AUT 283 Advanced Automotive Electronics 2-2-3

Prerequisite: AUT 161

This course covers advanced electronic systems on automobiles. Topics include microcontrollers, on-board communications, telematics, hybrid systems, navigation, collision avoidance, and electronic accessories. Upon completion, students should be able to diagnose electronic systems using appropriate service information, procedures, and equipment and remove/replace/reprogram controllers, sensors, and actuators.

CIS 111 Basic PC Literacy 1-2-2

This course provides an overview of computer concepts. Emphasis is placed on the use of personal computers and software applications for personal and fundamental workplace use. Upon completion, students should be able to demonstrate basic personal computer skills.

ENG 110 Freshman Composition 3-0-3

Prerequisites: RED 080 and ENG 090 or appropriate placement test scores

This course is the first course in a series of two designed to develop informative and business writing skills. Emphasis is placed on logical organization of writing, including effective introductions and

conclusions, precise use of grammar, and appropriate selection and use of sources. Upon completion, students should be able to produce clear, concise, well-organized short papers.

ENG 111 Expository Writing 3-0-3

Prerequisites: RED 090 and ENG 090 or appropriate placement test scores

Corequisites: ENG 111A

This course is the required first course in a series of two designed to develop the ability to produce clear expository prose. Emphasis is placed on the writing process including audience analysis, topic selection, thesis support and development, editing, and revision. Upon completion, students should be able to produce unified, coherent, well-developed essays using standard written English. *This course has been approved to satisfy the Comprehensive Articulation Agreement general education core requirement in English composition.*

ENG 111A Expository Writing Lab 0-2-1

Prerequisites: RED 090 and ENG 090 or appropriate placement test scores

Corequisites: ENG 111

This writing laboratory is designed to apply the skills introduced in ENG 111. Emphasis is placed on the editing and revision components of the writing process. Upon completion, students should be able to apply those skills in the production of final drafts in ENG 111. The computer is used as a writing and design tool for this course.

ENG 114 Prof. Research and Reporting 3-0-3

Prerequisites: ENG 111

This course, the second in a series of two, is designed to teach professional communication skills. Emphasis is placed on research, listening, critical reading and thinking, analysis, interpretation, and design used in oral and written presentations. Upon completion, students should be able to work individually and collaboratively to produce well-designed business and professional written and oral presentations. The computer is used as a writing and design tool for this course. *This course has been approved to satisfy the Comprehensive Articulation Agreement general education core requirement in English composition.*

ENG 116 Technical Report Writing 3-0-3

Prerequisites: ENG 110 or ENG 111

This course, the second in a series of two, introduces layout and design of technical reports used in business and industry. Emphasis is placed on audience analysis, data collection and analysis, technical writing style and organization, oral presentation or technical data, and the appropriate use of graphics in written and oral presentations. Upon completion, students should be able to produce written and oral reports using a variety of technical communication models.

MAT 115 Mathematical Models 2-2-3

Prerequisites: MAT 070, MAT 080, MAT 120, MAT 121, MAT 161, MAT 171, or MAT 175 or appropriate placement test scores

This course develops the ability to utilize mathematical skills and technology to solve problems at a level found in non-mathematics-intensive programs. Topics include applications to percent, ratio and proportion, formulas, statistics, functional notation, linear functions and their groups, probability, sampling techniques, scatter plots, and modeling. Upon completion, students should be able to solve practical problems, reason and communicate with mathematics, and work confidently, collaboratively, and independently.

PHY 121 Applied Physics I

3-2-4

Prerequisites: MAT 060

This algebra-based course introduces fundamental physical concepts as applied to industrial and service technology fields. Topics include systems of units, problem-solving methods, graphical analyses, vectors, motion, forces, Newton's laws of motion, work, energy, power, momentum, and properties of matter. Upon completion, students should be able to demonstrate an understanding of the principles studied as applied in industrial and service fields

WLD 112 Basic Welding Processes

1-3-2

This course introduces basic welding and cutting. Emphasis is placed on beads applied with gases, mild steel fillers, and electrodes and the capillary action of solder. Upon completion, students should be able to set up welding and oxy-fuel equipment and perform welding, brazing, and soldering processes.