CENTRAL CAROLINA COMMUNITY COLLEGE

Applied Technologies

Program Planning Guide

Automotive Systems Technology, Electrical Vehicle Track, Associate in Applied Science (A60160EV)

Program Length: 5 semesters
Program Sites: Lee Main Campus - Day Program
Career Pathway Options: Associate in Applied Science Degree in Automotive Systems (Electrical Vehicle Track) Technology

Suggested Course Schedule		Class	Lab	Work	Credits	Notes:
1st Semester (fall)						
ACA 122	College Transfer Success	0	2	0	1	
EVX 115	Light Electric Vehicle Tech	1	2	0	2	
EVX 110	Intro to Electrified Transportation	1	2	0	2	
TRN 120	Basic Transp Electricity	4	3	0	5	
TRN 170	PC Skills for Transp	1	2	0	2	
Mathematics requirement		2	3	0	4	
	Total Semester Hours	**9**	**14**	**0**	**16**	
2nd Semester (spring)						
AUT 141	Suspension & Steering Sys	2	3	0	3	
AUT 141A	Suspension & Steering Lab	0	3	0	1	
EVX 120	Electric Vehicle Technology	2	3	0	3	
EVX 130	Hybrid Vehicle Technology	2	3	0	3	
ENG 111	Writing and Inquiry	3	0	0	3	
	Total Semester Hours	**9**	**12**	**0**	**13**	
3rd Semester (summer)						
ATT 125	Hybrid-Electric Transportation	2	4	0	4	
AUT 114	Safety and Emissions	1	2	0	2	
AUT 114A	Safety and Emissions Lab	0	2	0	1	
TRN 140	Transp Climate Control	1	2	0	2	

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TRN 140A	Transp Climate Cont Lab	1	2	0	2	
	Total Semester Hours	**5**	**12**	**0**	**11**	
4th Semester (fall)						
AUT 151	Brake Systems	2	3	0	3	
AUT 151A	Brake Systems Lab	0	3	0	1	
TRN 150	Adv Driver Assist System	2	3	0	3	
TRN 150A	Adv Driver Assist System Lab	0	3	0	1	
AUT 181	Engine Performance I	2	3	0	3	
Communications requirement		3	0	0	3	
	Total Semester Hours	9	15	0	14	
5th Semester (spring)						
ATT 140	Emerging Transp Tech	2	3	0	3	
EVX 240	Hybrid/EV Advance Diagnostics	1	4	0	3	
EVX 240A	Hybrid/EV Advance Diagnostics Lab	0	3	0	1	
TRN 145	Adv Transp Electronics	2	3	0	3	
Humanities/Fine Arts Elective		3	0	0	3	
Social/Behavioral Science Elective		3	0	0	3	
	Total Semester Hours	11	13	0	15	
Total Semester Credit Hours Required for Graduation: 69						

Course Descriptions

ACA 122 College Transfer Success
This course provides information and strategies necessary to develop clear academic and professional goals beyond the community college experience. Topics include the CAA, college policies and culture, career exploration, gathering information on senior institutions, strategic planning, critical thinking, and communications skills for a successful academic transition. Upon completion, students should be able to develop an academic plan to transition successfully to senior institutions. This course has been approved for transfer under the CAA/ICAA as a premajor and/or elective course requirement.

ATT 115 Green Trans Safety & Service
This course covers workplace safety, hazardous material and environmental regulation relevant to electric, hybrid and alternative fueled vehicles. Topics include safety of high voltage vehicle systems, gaseous fuel systems and alternative liquid fuels. Upon completion, students should be able to demonstrate safe work practices, utilize appropriate shop tools and explain government regulations associated with alternative transportation.

ATT 125 Hybrid-Electric Transportation
Prerequisite: TRN 120
This course covers the theory and operation of hybrid-electric drive vehicles. Topics include maintenance, diagnostics, repair and safety procedures for electrically propelled and hybrid vehicles. Upon completion, students should be able to perform diagnostics, maintenance and repair hybrid-electric drive vehicles.

ATT 140 Emerging Transp Tech
This course covers emerging technologies in the automotive industry and diagnostic procedures associated with those technologies. Topics include exploring new technologies, diagnostic tools, methods and repairs. Upon completion, students should be able to demonstrate practical skills applicable to emerging transportation technologies.

AUT 114 Safety and Emissions
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
Corequisite: Take 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 emissions 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 141 Suspension & Steering Sys
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
Corequisite: Take 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

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 Brakes Systems Lab
Corequisite: Take 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 systems technologies. Upon completion, students should be able to diagnose, service, and repair various automotive braking systems.

ENG 111 Writing and Inquiry
Corequisite: Take ENG 045
This course is designed to develop the ability to produce clear writing in a variety of genres and formats using a recursive process. Emphasis includes inquiry, analysis, effective use of rhetorical strategies, thesis development, audience awareness, and revision. Upon completion, students should be able to produce unified, coherent, well-developed essays using standard written English. This course has been approved for transfer under the CAA/ICAA as a general education course in English Composition.

ENG 114 Prof Research & Reporting
Prerequisite: Take 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. This course has been approved for transfer under the CAA/ICAA as a general education course in English Composition.

EVX 110 Intro to Electrified Transp
This course covers the fundamentals of electrified transportation technologies, emphasizing workplace safety and environmental regulation to alternative fuels. Topics include the safety protocols for high-voltage vehicle systems, gaseous and liquid alternative fuels, and Plugin Hybrid and EV charging infrastructure. Upon completion, students should be able to demonstrate safe work practices, service modern hybrid and electric vehicles.

EVX-115 Light Electric Vehicle Tech
This course introduces the core technologies common to all Electric & Hybrid Vehicles (xEVs), covering basic electric motor, battery, and controller theory, including special test and charging equipment. Topics include DC and AC motor & motor controller technologies with hands-on Light EV BLDV motor & controller technologies, as well as Battery, Battery Management, and Battery Charging technologies. Upon completion, students should be able to understand how xEV motors, motor controllers, battery packs, and battery charging systems work and diagnose common malfunctions in all these xEV core technologies.

EVX 120 Electric Vehicle Technologies
Prerequisite: Take TRN 120
This course covers the essential systems and technologies of electric vehicles (EVs), focusing on safety and maintenance. Topics include a review of electrical principles, high-voltage safety protocols, and the design, testing, and maintenance of crucial EV components such as batteries, motors, inverters, and onboard chargers. Upon completion, students should be able to perform diagnostic evaluations and effectively maintain and troubleshoot battery electric vehicles.

EVX 130 Hybrid Vehicle Technologies
Prerequisite: Take TRN 120
This course covers the critical systems and technologies of hybrid vehicles, focusing on safety and maintenance. Topics include a review of electrical principles and safety protocols for hybrid and battery-electric vehicles (BEVs) and the design, testing, and maintenance of critical components such as batteries, motors, inverters, and transmissions. Upon completion, students should be able to perform diagnostic evaluations and effectively maintain and troubleshoot hybrid vehicles.

EVX 240 Hybrid/Ev Adv Diag
Prerequisite: Take One Set 1: EVX-120 SET 2: EVX 130
This course provides advanced diagnostic strategies for high-voltage components found in EVXs. Topics include the evaluation of individual battery modules and contactors, motor and inverter diagnostics, EVSE and onboard charger diagnosis, thermal management systems diagnosis, and EV conversions. Upon completion, students should be able to select appropriate test equipment to diagnose high-voltage components and make repairs.

EVX 240A Hybrid/Ev Adv Diag Lab
Corequisite Take EVX-240
This course is an optional lab to be used in conjunction with/or as an alternative to work-based learning. Topics include the evaluation of individual battery modules and contactors, motor and inverter diagnostics, EVSE and onboard charger diagnosis, thermal management systems diagnosis, and EV conversions. Upon completion, students should be able to select appropriate test equipment to diagnose high-voltage components and make repairs.

MAT 110 Math Measurement & Literacy
This course provides an activity-based approach that develops measurement skills and mathematical literacy using technology to solve problems for non-math intensive programs. Topics include unit conversions and estimation within a variety of measurement systems; ratio and proportion; basic geometric concepts; financial literacy; and statistics including measures of central tendency, dispersion, and charting of data. Upon completion, students should be able to demonstrate the use of mathematics and technology to solve practical problems, and to analyze and communicate results.

PHY 110 Conceptual Physics
This course provides a conceptually-based exposure to the fundamental principles and processes of the physical world. Topics include basic concepts of motion, forces, energy, heat, electricity, magnetism, and the structure of matter and the universe. Upon completion, students should be able to describe examples and applications of the principles studied. This course has been approved for transfer under the CAA/ICAA as a general education course in Natural Science.

PHY 110A Conceptual Physics Lab
Corequisite: Take PHY 110
This course is a laboratory for PHY 110. Emphasis is placed on laboratory experiences that enhance materials presented in PHY 110. Upon completion, students should be able to apply the laboratory experiences to the concepts presented in PHY 110. This course has been approved for transfer under the CAA/ICAA as a general education course in Natural Science.

TRN 120 Basic Transp Electricity
This course covers basic electrical theory, wiring diagrams, test equipment, and diagnosis, repair and replacement of batteries, starters, and alternators. Topics include Ohm's Law, circuit construction, wiring diagrams, circuit testing, and basic troubleshooting. Upon completion, students should be able to properly use wiring diagrams, diagnose, test, and repair basic wiring, battery, starting, charging, and electrical concerns.

TRN 140 Transp Climate Control
This course covers the theory of refrigeration and heating, electrical/electronic/pneumatic controls, and diagnosis and 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 diagnose and repair vehicle climate control systems.

TRN 140A Transp Climate Control Lab
This course provides experiences for enhancing student skills in the diagnosis and repair of transportation climate control systems. Emphasis is placed on reclaiming, recovery, recharging, leak detection, climate control components, diagnosis, air conditioning equipment, tools and safety. Upon completion, students should be able to describe the operation, diagnose, and safely service climate control systems using appropriate tools, equipment, and service information.

TRN 145 Adv. Transp Electronics
Prerequisite: Take TRN 120
This course covers advanced transportation electronic systems including programmable logic controllers, on-board data networks, telematics, high voltage systems, navigation, collision avoidance systems and electronic accessories. Topics include interpretation of wiring schematics, reprogramming PLC?s, diagnosing and testing data networks and other electronic concerns. Upon completion, students should be able to reprogram PLC?s, diagnose and test data networks and other electronic concerns, and work safely with high voltage systems.

TRN 170 PC Skills for Transp
This course introduces students to personal computer literacy and Internet literacy with an emphasis on the transportation 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 transportation technology and perform word processing.

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Approved Humanities/Fine Arts Electives
Associate in Applied Science Degree/Diploma

ART 111	Art Appreciation
ART 114	Art History Survey I
ART 115	Art History Survey II
DRA 111	Theatre Appreciation
ENG 125	Creative Writing I
ENG 231	American Literature I
ENG 232	American Literature II
ENG 241	British Literature I
ENG 242	British Literature II
HUM 110	Technology & Society
HUM 115	Critical Thinking
HUM 120	Cultural Studies
HUM 122	Southern Culture
HUM 150	American Women's Studies
HUM 160	Introduction to Film
MUS 110	Music Appreciation
MUS 112	Introduction to Jazz
PHI 240	Introduction to Ethics
REL 110	World Religions
REL 211	Intro to Old Testament
REL 212	Intro to New Testament

Approved Social/Behavioral Science Electives
Associate in Applied Science Degree/Diploma

ANT 210	General Anthropology
ANT 220	Cultural Anthropology
ECO 151	Survey of Economics
ECO 251	Principles of Microeconomics
ECO 252	Principles of Macroeconomics
HIS 111	World Civilization I
HIS 112	World Civilization II
HIS 131	American History I
HIS 132	American History II
HIS 222	African-American History I
HIS 223	African-American History II
HIS 226	The Civil War
HIS 236	North Carolina History
POL 120	American Government
PSY 150	General Psychology
PSY 237	Social Psychology
PSY 241	Developmental Psychology
PSY 246	Adolescent Psychology
PSY 281	Abnormal Psychology
SOC 210	Introduction to Sociology
SOC 213	Sociology of the Family
SOC 220	Social Problems
SOC 225	Social Diversity
SOC 232	Social Context of Aging
SOC 240	Social Psychology