

Electrical Engineering Technology

The Associate in Applied Science degree in Electrical Engineering Technology has been specifically designed to prepare individuals to become advanced technicians in the workforce.

Electrical Engineering Technicians (Associates degree holders) typically build, install, test, troubleshoot, repair, and modify developmental and production electronic components, equipment, and systems such as industrial/computer controls, manufacturing systems, instrumentation systems, communication systems, and power electronic systems.

A broad-based core of courses ensures that students develop the skills necessary to perform entry-level tasks. Emphasis is placed on developing the ability to think critically, analyze, and troubleshoot electronic systems. Beginning with electrical fundamentals, course work progressively introduces electronics, 2D Computer Aided Design (CAD), circuit simulation, solid-state fundamentals, digital concepts, instrumentation, C++ programming, microprocessors, programmable Logic Controllers (PLCs). Other course work includes the study of various fields associated with the electrical/electronic industry.

This degree program focuses on the knowledge and skills associated with the installation, maintenance, integration and troubleshooting of instrumentation and control systems. It is intended for workforce development to permit students to go directly into industry with this degree.

Graduates should qualify for employment as engineering assistants or as computer, electrical, or electronic technicians with job titles such as, electronics engineering technician, field service technician, maintenance technician, communications technician, electronic tester, electronic systems integrator, electrical and electronics repairers, electromechanical equipment assemblers, electrical drafter, electronics and instrumentation technician, control technician, bench technician, electric motor, power tool, and related repairers, or production control technician.

The AAS degree in Electrical Engineering Technology is accepted at some colleges and universities as the first two years of a bachelor's-level engineering technology program and graduates can transfer to a university program to finish a bachelor's degree; however there will be deficiencies.

The [Electronics Engineering Technology AAS Degree program](#) is designed for students planning to continue to a four-year bachelor's degree in engineering technology.

For specific information about potential positions and wages in Electrical Engineering Technology employment, visit the Central Piedmont Career Coach (<https://cpcc.emsicc.com/programs/electrical-engineering-technology-academic-program-for-credit/198260?radius=®ion=50%20Mile%20Radius>) website.

Electrical Engineering Technology (A40180)

Degree Awarded

The Associate in Applied Science Degree - Electrical Engineering Technology is awarded by the College upon completion of the program.

Program Accreditation

The Electrical Engineering Technology program at Central Piedmont is accredited by the Engineering Technology Accreditation Commission (TAC) of the Accreditation Board of Engineering and Technology (ABET (<http://www.abet.org>)).

How to Apply:

Complete a Central Piedmont admissions application through Get Started (<http://www.cpcc.edu/getstarted>) **on the Central Piedmont website.**

More Information:

For a printer-friendly version of this information, download the Electrical Engineering Technology Flyer (<http://www.cpcc.edu/et/academic-programs/electrical-engineering-technology/electrical-engineering-technology-a40180-flyer>) or the Electrical Engineering Technology Program Educational Objectives (http://catalog.cpcc.edu/programsofstudy/collegelevelprograms/associateinappliedscienceaasdegreesdiplomasampcertificates/electricalengineeringtechnology/CEEET_OBJES.pdf) under More Information on the Electrical Engineering Technology (<http://www.cpcc.edu/et/academic-programs/electrical-engineering-technology>) website.

Current departmental news is available at CEEET (<http://blogs.cpcc.edu/ceet>), the online Computer, Electrical and Electronics Engineering Technology Newsletter.

Contact Information

For questions about the program or for assistance as a student in the program, contact faculty advising. The Electrical Engineering Technology program is in the Engineering Technology Division. For additional information, visit Engineering Technologies Division (<http://www.cpcc.edu/et>) website or call the Program Chair at 704.330.6479.

General Education Requirements

ENG 111	Writing and Inquiry	3.0
Select one of the following:		3.0
ENG 112	Writing and Research in the Disciplines	
ENG 113	Literature-Based Research	
ENG 114	Professional Research & Reporting	
Select one of the following courses:		3.0
COM 110	Introduction to Communication	
COM 231	Public Speaking	
MAT 171	Precalculus Algebra	4.0
Select 3 credits of the following:		3.0
ART 111	Art Appreciation	
ART 114	Art History Survey I	
ART 115	Art History Survey II	
HUM 120	Cultural Studies	
HUM 130	Myth in Human Culture	
MUS 110	Music Appreciation	
MUS 112	Introduction to Jazz	
PHI 215	Philosophical Issues	
PHI 240	Introduction to Ethics	
REL 110	World Religions	
Select 3 credits of the following:		3.0

ECO 251	Principles of Microeconomics	
ECO 252	Principles of Macroeconomics	
HIS 111	World Civilizations I	
HIS 112	World Civilizations II	
HIS 131	American History I	
HIS 132	American History II	
POL 120	American Government	
PSY 150	General Psychology	
SOC 210	Introduction to Sociology	
Major Requirements		
ELN 133	Digital Electronics	4.0
ELC 231	Electric Power Systems	4.0
ELC 135	Electrical Machines	3.0
ELN 131	Analog Electronics I	4.0
ELN 260	Prog Logic Controllers	4.0
ELN 150	Computer-Aided Drafting for Electronics	2.0
Select one of the following:		4.0
ELC 138 & ELC 139	DC Circuit Analysis and AC Circuit Analysis	
ELC 131	Circuit Analysis I	
ELC 133	Circuit Analysis II	4.0
PCI 170	DAQ and Control	4.0
CSC 134	C++ Programming	3.0
ELN 232	Introduction to Microprocessors	4.0
Select 4 credits from the following:		4.0
PHY 151	College Physics I	
PHY 251	General Physics I	
MAT 172	Precalculus Trigonometry	4.0
WBL 112	Work-Based Learning I	2.0
or ISC 112	Industrial Safety	
Total Credits		69

No diplomas are offered in Electrical Engineering Technology.

Electrical Engineering Technology Certificates (C40180)

Electrical Engineering Technology with a Specialization in Electrical Engineering Technology Pathway(C40180-C5)

This certificate also is available to high school students dually enrolled in Career and College Promise.

General Education Requirements

MAT 121	Algebra/Trigonometry I	3.0
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Major Requirements

ELC 131	Circuit Analysis I	4.0
ELN 131	Analog Electronics I	4.0
ELN 133	Digital Electronics	4.0

Total Credits		15
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ELC 111. Introduction to Electricity. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course introduces the fundamental concepts of electricity and test equipment to non-electrical/electronics majors. Topics include basic DC and AC principles (voltage, resistance, current, impedance); components (resistors, inductors, and capacitors); power; and operation of test equipment. Upon completion, students should be able to construct and analyze simple DC and AC circuits using electrical test equipment.

ELC 112. DC/AC Electricity. 5.0 Credits. Class-3.0. Clinical-0.0. Lab-6.0. Work-0.0

This course introduces the fundamental concepts of and computations related to DC/AC electricity. Emphasis is placed on DC/AC circuits, components, operation of test equipment; and other related topics. Upon completion, students should be able to construct, verify, and analyze simple DC/AC circuits.

ELC 113. Residential Wiring. 4.0 Credits. Class-2.0. Clinical-0.0. Lab-6.0. Work-0.0

This course introduces the care/usage of tools and materials used in residential electrical installations and the requirements of the National Electrical Code. Topics include NEC, electrical safety, and electrical print reading; planning, layout; and installation of electrical distribution equipment; lighting; overcurrent protection; conductors; branch circuits; and conduits. Upon completion, students should be able to properly install conduits, wiring, and electrical distribution equipment associated with residential electrical installations.

ELC 114. Commercial Wiring. 4.0 Credits. Class-2.0. Clinical-0.0. Lab-6.0. Work-0.0

This course provides instruction in the application of electrical tools, materials, and test equipment associated with commercial electrical installations. Topics include the NEC; safety; electrical blueprints; planning, layout, and installation of equipment and conduits; and wiring devices such as panels and overcurrent devices. Upon completion, students should be able to properly install equipment and conduit associated with commercial electrical installations.

ELC 115. Industrial Wiring. 4.0 Credits. Class-2.0. Clinical-0.0. Lab-6.0. Work-0.0

This course covers layout, planning, and installation of wiring systems in industrial facilities. Emphasis is placed on industrial wiring methods and materials. Upon completion, students should be able to install industrial systems and equipment.

ELC 117. Motors and Controls. 4.0 Credits. Class-2.0. Clinical-0.0. Lab-6.0. Work-0.0

This course introduces the fundamental concepts of motors and motor controls. Topics include ladder diagrams, pilot devices, contactors, motor starters, motors, and other control devices. Upon completion, students should be able to properly select, connect, and troubleshoot motors and control circuits.

ELC 118. National Electrical Code. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers the use of the current National Electrical Code. Topics include the NEC history, wiring methods, overcurrent protection, materials, and other related topics. Upon completion, students should be able to effectively use the NEC.

ELC 119. NEC Calculations. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers branch circuit, feeder, and service calculations. Emphasis is placed on sections of the National Electrical Code related to calculations. Upon completion, students should be able to use appropriate code sections to size wire, conduit, and overcurrent devices for branch circuits, feeders, and service.

ELC 121. Electrical Estimating. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers the principles involved in estimating electrical projects. Topics include take-offs of materials and equipment, labor, overhead, and profit. Upon completion, students should be able to estimate simple electrical projects.

ELC 125. Diagrams and Schematics. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers the interpretation of electrical diagrams, schematics, and drawings common to electrical applications. Emphasis is placed on reading and interpreting electrical diagrams and schematics. Upon completion, students should be able to read and interpret electrical diagrams and schematics.

ELC 127. Software for Technicians. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces computer software which can be used to solve electrical/electronics problems. Topics include electrical/electronics calculations and applications. Upon completion, students should be able to utilize a personal computer for electrical/electronics- related applications.

ELC 128. Introduction to Programmable Logic Controller. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces the programmable logic controller (PLC) and its associated applications. Topics include ladder logic diagrams, input/output modules, power supplies, surge protection, selection/installation of controllers, and interfacing of controllers with equipment. Upon completion, students should be able to understand basic PLC systems and create simple programs.

ELC 130. Advanced Motors and Controls. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers motors concepts, construction and characteristics and provides a foundation in motor controls. Topics include motor control ladder logic, starters, timers, overload protection, braking, reduced voltage starting, SCR control, AC/DC drives, system and component level troubleshooting. Upon completion, students should be able to specify, connect, control, troubleshoot, and maintain motors and motor control systems.

Prerequisites: Take One: ELC 111, ELC 112, ELC 131, or ELC 138

ELC 131. Circuit Analysis I. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces DC and AC electricity with an emphasis on circuit analysis, measurements, and operation of test equipment. Topics include DC and AC principles, circuit analysis laws and theorems, components, test equipment operation, circuit simulation, and other related topics. Upon completion, students should be able to interpret circuit schematics; design, construct, verify, and analyze DC/AC circuits; and properly use test equipment.

Corequisites: Take MAT 121 or MAT 171

ELC 133. Circuit Analysis II. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-3.0. Work-0.0

This course covers additional concepts of DC/AC electricity, the use of test equipment, and measurement techniques. Topics include the application of network theorems such as delta/gye transformations, Superposition Theorem, and other advanced circuit analysis principles. Upon completion, students should be able to construct and analyze DC/AC circuits used advanced circuit analysis theorems, circuit simulators, and test equipment. Prerequisites: Take ELC 131 Minimum grade C

ELC 135. Electrical Machines. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers magnetic circuits, transformers, DC/AC machines, and the three-phase circuit fundamentals including power factor. Topics include magnetic terms and calculations, transformer calculations based on primary or secondary equivalent circuits, and regulation and efficiency calculations. Upon completion, students should be able to perform regulation and efficiency calculations for DC/AC machine circuits. Prerequisites: Take ELC 139 or ELC 131 Minimum grade C

ELC 136. Electrical Machines II. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-3.0. Work-0.0

This course covers DC/AC machine fundamentals including applications and control. Topics include control devices and induction single and polyphase AC motors, DC motors, stepper, and special purpose motors. Upon completion, students should be able to perform regulation and efficiency calculations and apply motor theory to practical control applications. Prerequisites: Take ELC 135 Minimum grade C

ELC 138. DC Circuit Analysis. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces DC electricity with an emphasis on circuit analysis, measurements, and operation of test equipment. Topics include DC principles, circuit analysis laws and theorems, components, test equipment operation, circuit simulation, and other related topics. Upon completion, students should be able to interpret circuit schematics; design, construct, and analyze DC circuits; and properly use test equipment.

ELC 139. AC Circuit Analysis. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces AC electricity with an emphasis on circuit analysis, measurements, and operation of test equipment. Topics include AC voltages, circuit analysis laws and theorems, reactive components and circuits, transformers, test equipment operation, circuit simulation, and other related topics. Upon completion, students should be able to interpret AC circuit schematics; analyze and troubleshoot AC circuits; and properly use test equipment.

Prerequisites: Take ELC 138

ELC 213. Instrumentation. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers the fundamentals of instrumentation used in industry. Emphasis is placed on electric, electronic, and other instruments. Upon completion, students should be able to install, maintain, and calibrate instrumentation.

Prerequisites: Take ELC 131 Minimum grade C

ELC 215. Electrical Maintenance. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces the theory of maintenance and the skills necessary to maintain electrical equipment found in industrial and commercial facilities. Topics include maintenance theory, predictive and preventive maintenance, electrical equipment operation and maintenance, and maintenance documentation. Upon completion, students should be able to perform maintenance on electrical equipment in industrial and commercial facilities.

ELC 220. Photovoltaic System Technology. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces the concepts, tools, techniques, and materials needed to understand systems that convert solar energy into electricity with photovoltaic (pv) technologies. Topics include site analysis for system integration, building codes, and advances in photovoltaic technology. Upon completion, students should be able to demonstrate an understanding of the principles of photovoltaic technology and current applications.

ELC 221. Advanced Photovoltaic System Designs. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces specific elements in photovoltaic (pv) systems technologies including efficiency, modules, inverters, charge controllers, batteries, and system installation. Topics include National Electrical Code (NEC), electrical specifications, photovoltaic system components, array design and power integration requirements that combine to form a unified structure. Upon completion, students should be able to demonstrate an understanding of various photovoltaic designs and proper installation of NEC compliant solar electric power systems.

Prerequisites: Take ELC 220

ELC 228. Programmable Logic Controllers Applications. 4.0 Credits. Class-2.0. Clinical-0.0. Lab-6.0. Work-0.0

This course covers programming and applications of programmable logic controllers. Emphasis is placed on programming techniques, networking, specialty I/O modules, and system troubleshooting. Upon completion, students should be able to specify, implement, and maintain complex PLC controlled systems.

ELC 229. Applications Project. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-3.0. Work-0.0

This course provides an individual and/or integrated team approach to a practical project as approved by the instructor. Topics include project selection and planning, implementation and testing, and a final presentation. Upon completion, students should be able to plan and implement an applications-oriented project.

ELC 230. Wind and Hydro Power Systems. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course introduces concepts, designs, tools, techniques, and material requirements for systems that convert wind and water into usable energy. Topics include the analysis, measurement, and estimation of potential energy of wind and water systems. Upon completion, students should be able to demonstrate an understanding of the technologies associated with converting wind and water into a viable energy source.

ELC 231. Electric Power Systems. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers the basic principles of electric power systems, including transmission lines, generator and transformer characteristics, and fault detection and correction. Emphasis is placed on line diagrams and per unit calculations for circuit performance analysis in regards to voltage regulation, power factor, and protection devices. Upon completion, students should be able to analyze simple distribution subsystems, calculate fault current, and compare different types and sizes of circuit protection devices.

Prerequisites: Take ELC 135 Minimum grade C

ELC 233. Energy Management. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers energy management principles and techniques typical of those found in industry and commercial facilities, including load control and peak demand reduction systems. Topics include load and peak demand calculations, load shedding, load balance and power factor, priority scheduling, remote sensing and control, and supplementary/alternative energy sources. Upon completion, students should be able to determine energy management parameters, calculate demand and energy use, propose energy management procedures, and implement alternative energy sources.

Corequisites: Take ELC 139

ELC 234. Electrical System Design. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces the principles of electrical design for commercial and industrial facilities. Topics include services, high and low power distribution, switchboards, panelboards, motor control centers, switchgear, overcurrent protection, and grounding. Upon completion, students should be able to design services, feeders, and branch circuits for typical commercial/industrial applications in accordance with the National Electrical Code.

ELC 1124. Electrical. 3.0 Credits. Class-3.0. Clinical-0.0. Lab-0.0. Work-0.0

This course is reserved for a freshmen-level course from an institution of the UNC System, contracted to be provided for a community college. The college should enter the course prefix/number, title, distribution of hours, prerequisites, corequisites, and course description as it appears in the UNC institution catalog. Upon successful completion, students should have earned 3 hours of credit equivalent to the course offered at the UNC institution.