Electrical Systems Technology

Electrical Systems Technology Suggested Course Sequences

The following is the suggested plan for when to take each course to complete the Associate in Applied Science degree, based on the program requirements of the 2023-2024 catalog. This is only a recommendation — you may take courses in another order upon consultation with your advisor. This plan is based on you starting with college-level math and English courses, starting your program in the fall, and attending full-time. You can also follow this sequence if you attend part-time. Speak with an advisor about the plan and any questions. This program might also offer diplomas or certificates; visit the catalog or contact the program for details.

Electrical Systems Technology - Electrical Design Track (A35130D)

Term I		Credits
MAT 110	Mathematical Measurement and Literacy	3.0
ACA 122	College Transfer Success	1.0
ELC 112	DC/AC Electricity	5.0
ELC 113	Residential Wiring	4.0
WOL 110	Basic Construction Skills	3.0
	Credits	**16**
Term II		
BPR 130	Print Reading-Construction	3.0
ELC 114	Commercial Wiring	4.0
ELC 117	Motors and Controls	4.0
ELC 125	Diagrams and Schematics	2.0
ELC 128	Introduction to Programmable Logic Controller	3.0
	Credits	**16**
Term III		
ENG 111	Writing and Inquiry	3.0
	Credits	**3**
Term IV		
ARC 114	Architectural CAD	2.0
ELC 115	Industrial Wiring	4.0
ELC 121	Electrical Estimating	2.0
ELC 118	National Electrical Code	2.0
ELC 119	NEC Calculations	2.0
ENG 112	Writing and Research in the Disciplines	3.0
You may have completed a program certificate(s). Confirm eligibility with your academic advisor.		
	Credits	**15**
Term V		
ARC 225	Architectural Building Information Modeling I	2.0
ELC 234	Electrical System Design	3.0
Humanities/Fine Arts		3.0
Behavioral/Social Science		3.0
Technical Elective		3.0
COM 231	Public Speaking	3.0
	Credits	**17**
	Total Credits	**67**

Electrical Systems Technology - Manufacturing Maintenance Technician Track (A35130M)

Term I		Credits
MAT 110	Mathematical Measurement and Literacy	3.0
WLD 112	Basic Welding Processes	2.0
ELC 112	DC/AC Electricity	5.0
ELC 113	Residential Wiring	4.0
WOL 110	Basic Construction Skills	3.0
	Credits	**17**
Term II		
ELC 114	Commercial Wiring	4.0
ELC 117	Motors and Controls	4.0
ELC 125	Diagrams and Schematics	2.0
ELC 128	Introduction to Programmable Logic Controller	3.0
ENG 111	Writing and Inquiry	3.0
	Credits	**16**
Term III		
ENG 112	Writing and Research in the Disciplines	3.0
	Credits	**3**
Term IV		
ARC 114	Architectural CAD	2.0
ELC 118	National Electrical Code	2.0
ELC 119	NEC Calculations	2.0
ELC 121	Electrical Estimating	2.0
ELC 215	Electrical Maintenance	3.0
Humanities/Fine Arts		3.0
Behavioral/Social Science		3.0
You may have completed a program certificate(s). Confirm eligibility with your academic advisor.		
	Credits	**17**
Term V		
ARC 225	Architectural Building Information Modeling I	2.0
ELC 130	Advanced Motors and Controls	3.0
ELC 228	Programmable Logic Controllers Applications	4.0
Technical Elective		3.0
COM 231	Public Speaking	3.0
ACA 122	College Transfer Success	1.0
	Credits	**16**
	Total Credits	**69**

Electrical Systems Technology - Solar Photovoltaic Track (A35130S)

Term I		Credits
MAT 110	Mathematical Measurement and Literacy	3.0
ACA 122	College Transfer Success	1.0
ELC 112	DC/AC Electricity	5.0
ELC 113	Residential Wiring	4.0
WOL 110	Basic Construction Skills	3.0
	Credits	**16**
Term II		
ELC 114	Commercial Wiring	4.0
ELC 117	Motors and Controls	4.0
ELC 125	Diagrams and Schematics	2.0
ELC 128	Introduction to Programmable Logic Controller	3.0
ENG 111	Writing and Inquiry	3.0
	Credits	**16**

Term III		
ENG 112	Writing and Research in the Disciplines	3.0
	Credits	**3**
Term IV		
ARC 114	Architectural CAD	2.0
ELC 118	National Electrical Code	2.0
ELC 119	NEC Calculations	2.0
ELC 121	Electrical Estimating	2.0
COM 231	Public Speaking	3.0
ELC 220	Photovoltaic System Technology	3.0
You may have completed a program certificate(s). Confirm eligibility with your academic advisor.		
	Credits	**14**
Term V		
ARC 225	Architectural Building Information Modeling I	2.0
Humanities/Fine Arts		3.0
Behavioral/Social Science		3.0
Technical Elective		3.0
ELC 130	Advanced Motors and Controls	3.0
ELC 234	Electrical System Design	3.0
	Credits	**17**
	Total Credits	**66**

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/wye 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 of 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 131, minimum grade of 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 of 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 of 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 of 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 131

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.