

ELECTRICAL SYSTEMS TECH-CT

Program Overview

Certificate of Achievement - Electrical Systems Technology

Professional Skills and Career Paths

Open pit electrician, underground mine electrician, manufacturing electrician, service electrician, industrial electrician.

Student Learning Outcomes

The Electrical Systems Technology Certificate program prepares students for careers in electrical work across various industries. The program offers flexible schedules and hands-on experience, enabling students to enter the work force directly, with an option to pursue an AAS degree.

Graduates of the Electrical Systems Technology certificate will be proficient in:

- Interpret Electrical Diagrams – Analyze and understand schematics, blueprints, and wiring diagrams to interpret electrical systems.
- Manage Motor & Control Systems – Operate and maintain motor-driven and computer-based control systems used in industrial and commercial settings.
- Apply Electrical Trade Theories – Demonstrate understanding of the fundamental principles that govern electrical systems and the electrical trade.
- Apply the National Electrical Code – Interpret and follow the National Electrical Code (NEC) standards for safe electrical installations.
- Use Electrical Tools and Equipment – Safely use industry-standard tools and equipment for electrical installations, repairs, and maintenance.
- Design & Troubleshoot Electrical Systems – Design, build, and troubleshoot electrical systems and components for commercial and industrial applications.
- Promote Workplace Safety – Follow safe work practices and comply with safety regulations to ensure a secure work environment.

Formal admission to this program is required.

For more information about any School of Industrial Technology and Workplace Development programs, contact 775-327-2167.

General Education Requirements

English/Communications (one course required)

ENG 100 Composition-Enhanced

5 Credits

Allows students to fulfill their first semester of English while completing the remediation process. Designed for students who did not place into ENG 101 on the placement test/writing sample, but did not score so low that they need ENG 95. Allows a student to refine specific skill deficiencies while completing the first semester of freshman composition (ENG 100 is equivalent to ENG 101). Students will have additional Academic Success Center requirements. Although it is a five-credit course, it does not replace ENG 102. After successful completion of ENG 100, a student must take ENG 102 to complete the general education requirement.

ENG 101 Composition I

3 Credits

Critical reading and writing of the expository essay. Emphasizes pre-writing, strategies for organization, and revision.

ENG 103 English Fund Tech Writing

3 Credits

Emphasizes the essentials of sentence structure, paragraph development, grammar, and punctuation. Class writing assignments apply these essentials to a variety of on-the-job related documents such as memos, letters, and reports. Course is recommended for students seeking certificates of achievement and meets the requirement for a 100-level English course. Upon successful completion of ENG 103, students may move directly into ENG 107 or ENG 101.

ENG 107 Tech Communications I

3 Credits

Basic skills necessary for successful on-the-job communications including improved letter and report writing, persuasion, interviewing, process, mechanism description, and business and technical grammar.

Mathematics (one course required): Choose from the courses listed below or any higher-level math course. Excludes MATH 389.

MATH 116 Technical Mathematics I

3 Credits

Provides technical mathematical core material so that the student gains practical problem solving experience. May include arithmetic operation, integers, exponents, scientific notation, algebraic expressions, equations, metric system, trigonometry, and logarithms. This course satisfies the general education requirement for occupational/technical AAS degree. It is recommended that students have completed prerequisites within two years of enrolling in this course.

MATH 116E Technical Mathematics Expanded

3-5 Credits

Provides technical mathematical core material so that the student gains practical problem solving experience. May include arithmetic operation, integers, exponents, scientific notation, algebraic expressions, equations, metric system, trigonometry, and logarithms. This course satisfies the general education requirement for occupational/technical AAS degree.

MATH 120 Fund of College Math

3 Credits

Includes set theory, logic, consumer mathematics, measurement, geometry, probability, and statistics. Course is broad in scope, emphasizing applications. It is recommended that students have completed prerequisites within two years of enrolling in this course.

- MATH 120E Fund of College Math Expanded 3 Credits**
Fundamentals of College Mathematics with Corequisite Support: Includes real numbers, consumer mathematics, variation, functions, relations, graphs, geometry, probability, and statistics. Course is broad in scope, emphasizing applications. Fulfills the lower-division mathematics requirement for a Bachelor of Arts Degree. Satisfies mathematics requirement for baccalaureate degrees.
- MATH 126 Precalculus I 3 Credits**
A third course in algebra that stresses polynomial, quadratic, rational, exponential, and logarithmic functions, including their graphs and applications; complex numbers; systems of equations; and basic operations with matrices and determinants, including Cramer's rule. It is recommended that students have completed prerequisites within two years of enrolling in this course.
- MATH 126E Precalculus I Expanded 3 Credits**
Precalculus I Expanded with Co-requisite support: Includes equations, relations, functions, graphing; polynomial, rational, exponential, logarithmic, and circular functions with applications; coordinate geometry of lines and conics; analytic trigonometry; matrices and determinants; and binomial theorem. It is recommended that students have completed prerequisites within two years of enrolling in this course.
- Human Relations (one course required)**
- BUS 110 Human Relations Employmnt 1-3 Credits**
Introduces students to the principles and skills of effective communication in business and professional settings. It provides information on how to communicate with superiors, co-workers, subordinates, clients, and customers. Three-credit course includes a computation component. Repeatable up to a total of three credits.
- HMS 200 Ethics in Human Services 3 Credits**
Real life applications for personal and professional boundaries, beliefs, ethics, values, morals, and codes of conduct in human relationships using ethical decision-making, problem-solving, and critical-thinking activities are emphasized. This course may be repeated up to three times for continuing education credit. (Check with individual licensing boards prior to registering).
- MGT 283 Intro Human Resource Mgt 3 Credits**
Duties and responsibilities of personnel management. Areas covered include employee needs, human relationships, orienting and training employees, benefit programs, and economics of supervision.
- PSY 208 Psy of Human Relations 3 Credits**
Explores the relationships between human beings and assists in the development of interpersonal communication skills which can be used personally and professionally.
- Program Requirements**
- ELM 112 Electrical Theory, DC 1-4 Credits**
The study of matter, atomic structure, electron theory, sources of electricity, and magnetism. Theory and shop application in Ohm's Law, voltage, current, resistance, and power in series, parallel, and series-parallel direct current circuits.
- ELM 120 Low Voltage Systems 1-3 Credits**
An introduction to low voltage systems used to distribute, carry, capture, and display voice, video, audio, and data signals. Topics include entertainment (video and audio media systems), communications (telephone, fax, modem, networks, and publication address systems), life safety (access control, alarm systems, and video surveillance), environmental control (HVAC and energy management), and automation controls (residential and commercial buildings).
- ELM 121 Circuit Design 1-2.5 Credits**
Developing and drawing electrical diagrams and graphs using standard electrical and JIC symbols.
- ELM 122 AC Theory 4 Credits**
Analyze AC series, parallel, and combination circuits with resistance, inductance, and capacitive elements using mathematics, measuring devices, and other test equipment.
- ELM 123 Solid State 1-2.5 Credits**
Study of the theory and operation of such solid-state devices as diodes, transistors, diacs, triacs, and SCRs.
- ELM 124 DC Gen, Motors & Controls 2 Credits**
Theory, design, applications, and testing of direct current (DC) generators, DC motors, and the study of such DC control devices as manual starting rheostats, reduced-voltage starting mechanisms, and speed controls.
- ELM 125 AC Motors and Alternators 2 Credits**
Theory, design, application, and testing of alternating current (AC) motors and alternators; single- and three-phase generation of alternating current; paralleling alternators; and calculating load and power factor characteristics under various load conditions.
- ELM 126 Motor Maintenance 2 Credits**
Explores the mechanical aspects of small and larger motor disassembly and assembly; bearing, commutator, slip ring and brush care; electrical maintenance; safety planning; and variable frequency drives.
- ELM 127 Intro to AC Controls .5-3 Credits**
Introduction to pilot devices, wiring diagrams, ladder diagrams, and basic motor circuits. Areas of emphasis include two- and three-wire controls, parallel stop-start, and hand-off automatic controls. May be repeated up to three credits.

ELM 128	Transfrmrs & Ind Lighting	4 Credits
Comprehensive study of the theory and operation of transformers and industrial lighting. The functions of various types of transformers and the maintenance and repair of industrial lighting systems will be emphasized. Perform the actual hookup and testing of basic single-phase and three-phase transformer connections. Observe and demonstrate proper safety and maintenance techniques and develop service wiring techniques.		
ELM 131	National Electric Code	2.5 Credits
Survey of the National Electric Code and its application to the safe installation of electrical conductors and equipment.		
ELM 132	Digital Concepts	1-2.5 Credits
Introduction to digital electronics including numbering systems, binary codes, Boolean algebra, and logic hardware.		
ELM 133	Advanced AC Controls	4 Credits
Applications and testing of a variety of AC controls, including limit switches, control relays, timing circuits, control transformers, and variable frequency drives.		
ELM 134	Intro Progrm Logic Cntrl	2.5 Credits
Introduction to programmable controller hardware, numbering systems, memory organization, and peripheral devices.		
ELM 135	Natl Elec Code 430	1 Credits
In-depth study of Article 430 of the National Electric Code and its application to motors, motor circuits, and controllers.		
ELM 136	Programmable Controls App	2.5 Credits
Practical experience in programming circuits using relay-type instructions, timers, counters, data manipulation, arithmetic functions, and other advanced features and techniques.		
ELM 141	Blueprint Reading	2 Credits
Focus on electrical prints, drawings, symbols, and specifications for construction and electrical plans.		
ELM 142	Raceways	2.5 Credits
Introduction to the types and applications of raceways, wireways, and ducts. Students will learn how to cut, ream, thread, connect, and bend conduit using hand, mechanical, hydraulic, and electric benders.		
ELM 143	Wiring Techniques	1-4 Credits
Practical application in a variety of building types and remodeling of existing buildings. Course will include job building, material estimation, tool and material use, and installation techniques.		

Suggested Course Sequence

1st Semester - Fall

Course Credits ELM 112 3.5 ELM 120 3 ELM 121 2 ELM 122 4 ELM 124 2 ELM 128 4 ELM 142 2.5 ELM 141 2 English/Communications* 3 Mathematics* 3 TOTAL 29 *Choose with advisor

2nd Semester - Spring

Course Credits ELM 123 2 ELM 125 2 ELM 126 2 ELM 127 2.5 ELM 131 2.5 ELM 132 2 ELM 133 4 ELM 134 2.5 ELM 135 1 ELM 136 2.5 ELM 143 3 Human Relations* 1-3 TOTAL 27-29 *Choose with advisor