

ELECTRICAL SYSTEMS TECH-AAS

Program Overview

Associate of Applied Science - Electrical Systems Technology

Professional Skills and Career Paths

Open pit electrician, underground mine electrician, manufacturing electrician, service electrician, I&E industrial electrician.

Student Learning Outcomes

The Associate of Applied Science (AAS) in Electrical Systems Technology program provides advanced training in electrical systems, preparing students for technical and leadership roles in industries like construction, manufacturing, power generation, and more. The program combines theoretical knowledge with practical experience.

Graduates of the AAS in Electrical Systems Technology program will be able to:

- Advanced Electrical System Design and Troubleshooting – Design, install, and troubleshoot complex electrical systems, including power distribution, motor controls, and automation systems, ensuring safe and efficient operation in commercial and industrial settings.
- Interpretation and Application of Technical Documentation – Analyze and apply advanced schematics, blueprints, and wiring diagrams to electrical installations, system modifications, and troubleshooting.
- Proficiency in Control Systems – Maintain and repair advanced motor control systems, programmable logic controllers (PLCs), and computer-based control systems, demonstrating deep knowledge of their operation and integration in various industries.
- Electrical Theory and Advanced Applications – Apply advanced electrical theories (e.g., circuits, electromagnetism, electronics) to solve complex electrical issues in industrial, commercial, and residential environments.
- National Electrical Code Compliance – Interpret and apply the National Electrical Code (NEC) to ensure safe and compliant electrical installations and maintenance, meeting local, state, and federal standards.
- Tool and Technology Mastery – Use and maintain advanced electrical tools, diagnostic equipment, and software, selecting the right technology for each task to ensure effective results.
- Workplace Safety and Regulatory Compliance – Follow safety practices and adhere to OSHA regulations and environmental policies, ensuring a safe work environment for all.
- Project Management and Leadership in Electrical Systems – Manage electrical projects, including budgeting, scheduling, and resource allocation, while leading teams in the installation, testing, and maintenance of electrical systems to industry standards.
- Effective Communication and Professional Development – Communicate technical information clearly to clients, team members, and supervisors, while demonstrating leadership, teamwork, and a commitment to professional ethics. Engage in continuous learning to stay current with emerging technologies in the electrical field.

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 Requirement

English/Communications (two courses required): ENG 100 or ENG 101 and ENG 102 or ENG 107 and ENG 108

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 102 Composition II

3 Credits

Continuation of English 101. Emphasizes writing from sources, argument, the investigative paper, and research techniques.

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.

ENG 108 Tech Communications II

3 Credits

Advanced letter and report writing techniques including proper word choice, tone, and structure. Business letters, memorandums, formal and informal reports, process, and mechanism descriptions.

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.
- STAT 152 Intro to Statistics 3 Credits**
Includes descriptive statistics, probability models, random variables, statistical estimation and hypothesis testing, linear regression analysis, and other topics. Designed to show the dependence of statistics on probability. It is recommended that students have completed prerequisites within two years of enrolling in this course.
- Science (one course required)**
- ANTH 102 Physical Anthropology 3 Credits**
Introduction to the study of how humans, Homo sapiens, have emerged as a species and come to dominate the planet by examining processes of human biological and cultural evolution. Topics include inheritance, the emergence of primates, fossil hominids, the development of technology, and biological variability among modern humans. Satisfies general education science.
- AST 101 General Astronomy 3 Credits**
An introductory examination of the solar system, stellar systems, and stellar and galactic evolution according to currently accepted concepts. Introduces astronomical instruments and light theory.
- BIOL 100 General Biology/Non Major 3 Credits**
Basic biological concepts, interpretation and application of scientific methods, and effects of biological advances on society. Core curriculum science course; cannot be used for credit toward field of concentration in biology.
- BIOL 190 Intro Cell/Molecular Biology 4 Credits**
Structure and function of cells. Major molecules of life; composition and physiology of cellular organelles; cell metabolism, reproduction, motility, and gene function of both plant and animal cells. Required for biology majors. Concurrent enrollment in a corresponding lab section is required for this course.
- CHEM 100 Molecules/Life Modrn Wrld 3 Credits**
Introduction to chemistry in its many forms and applications, physical and organic, with consideration of environmental and social issues. Includes laboratory activities.
- CHEM 121 General Chemistry I 4 Credits**
Fundamentals of chemistry including reaction stoichiometry, atomic structure, chemical bonding, molecular structure, states of matter, and thermochemistry.
- ENV 100 Humans and the Environment 3 Credits**
Introduction to the relationship of man and his environment. Current thinking and research concerning the impact of industrialization and urbanization on environmental quality, including the population explosion; the potential decline of the affluent society by the depletion of natural resources; the pollution of air, land surface, and water; and the public agencies and policies designed to solve environmental problems.
- GEOG 103 Physical Geog Earth Environmnt 3 Credits**
Physical elements of the earth's natural features and their significance to man. Topics include earth form and motion, landforms, weather, climate, vegetation, and soils. Four laboratory experiences required.
- GEOL 101 Exploring Planet Earth 3-4 Credits**
Fundamental principles of geology including tectonic and surficial processes, oceans, atmosphere, environmental applications, and resources. Includes a laboratory component.

GEOL 132	Rocks and Minerals	3 Credits
An introduction to the more common or important minerals and rocks. Emphasizes the conditions of formation and hand sample identification. The economic value of minerals and rocks is presented.		
NUTR 121	Human Nutrition	3 Credits
An introductory nutrition course for the beginning student. Course will center on the major nutrients and their roles in maintaining good health. Students will learn to recognize well-balanced diets and acquire shopping tips and preparation techniques for optimum utilization of food dollars. Class includes four required labs.		
PHYS 100	Introductory Physics	3 Credits
A concise treatment of the basic principles of physics. Includes mechanics, matter, electricity, magnetism, heat, sound, light, relativity, and nuclear physics.		
PHYS 107	Technical Physics I	3 Credits
Investigates traditional topics of physics. Topics include mechanics, electricity, basic solid state components, optics, gases, hydraulics, fluids, and thermodynamics. This course provides a basic understanding of how physical systems are related and their technical applications. Hands-on labs, demonstrations, and calculations are an integral part of the course.		
PHYS 152	Gen Physics II	4 Credits
A continuation of PHYS 151. Topics include electrostatics, circuits, magnetism, induction, AC circuits, electronics, light optics, special relativity, and an introduction in quantum theory. Lab included.		
U.S. and Nevada Constitutions: HIST 101 and HIST 102 or PSC 101		
HIST 101	U.S. History to 1877	3 Credits
Survey of U.S. political, social, economic, diplomatic, and cultural development from colonial times through Reconstruction. When taken with HIST 102 satisfies the GBC General Education American Constitutions and Institutions Requirement. HIST 101 and 102 need not be taken sequentially. Either class may be taken alone.		
HIST 102	U.S. History Since 1877	3 Credits
Survey of U.S. political, social, economic, diplomatic, and cultural development from 1877 to the present. Course satisfies the Nevada Constitution Requirement. When taken with HIST 101 satisfies the GBC General Education American Constitutions and Institutions Requirement. Can be used to satisfy the Nevada Constitution Requirement for out-of-state transfer students who have previously satisfied the United States Constitution Requirement. HIST 101 and 102 need not be taken sequentially. Either class may be taken alone.		
PSC 101	Intro American Politics	3 Credits
A survey of United States, national, state, and local governments with emphasis on the cultural aspects of the governing process. Satisfies the legislative requirement for the United States and Nevada Constitutions.		
Social Science/Human Relations (one course required)		
BUS 110	Human Relations Employment	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.		
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.		
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).		
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.		
Humanities or Fine Arts (one course required)		
ART 100	Visual Foundations	3 Credits
A beginning art class that includes a survey of art and the basic components of design. The class explores visual concepts as they relate to the history of art through class presentations, discussions, and a variety of media. Students should plan for three hours of studio work outside the class.		
ART 101	Drawing I	3 Credits
A disciplined foundation in drawing concepts based on visual observation skills.		
ART 107	Design Fundmntls I (2-D)	3 Credits
Explores the fundamentals of design using various media focusing on 2-D design.		
ART 160	Art Appreciation	3 Credits
Introduction to the visual arts, illustrating the place of art in its social and cultural setting.		
ART 260	Survey of Art History I	3 Credits
Presentation of the historical context of major and minor works of art from the ancient world to the Renaissance, art analysis, and criticism.		

ART 261	Survey of Art History II	3 Credits
A continuation of Survey of Art History I presenting major and minor works of art from the Renaissance to the present, art analysis, and criticism.		
ENG 203	Intro to Literary Study	3 Credits
Introduction to the elements of fiction, poetry, and drama used in the analysis of literature.		
ENG 205	Intro to Creative Writing	3 Credits
A creative writing course designed to introduce students to the production of fiction and poetry.		
ENG 223	Themes of Literature	3 Credits
Themes and ideas significant in literature.		
FIS 100	Introduction to Film	3 Credits
Introduction to the historical development of film as art. Considers the development of cinematic techniques (i.e., cinematography, editing, sound, etc.), cinematic genres (i.e., the western, romantic comedy, etc.) and narrative elements (i.e., plot, character, conflict, etc.) as exemplified by the work of major American and international directors.		
FREN 111	First Year French I	3-4 Credits
Development of language skills through practice in listening, speaking, reading, writing, and structural analysis. Language practice required.		
FREN 112	First Year French II	3-4 Credits
A continuation of FREN 111. Language practice required.		
HIST 208	World History I	3 Credits
Survey of world civilizations to 1600. Examines societies, cultures, and issues relative to Africa, the Americas, Asia, Europe, the Middle East and Oceania.		
HIST 209	World History II	3 Credits
Survey of world civilizations since 1600. Examines historical societies, cultures, and issues relative to Africa, the Americas, Asia, Europe, the Middle East, and Oceania.		
HUM 101	Intro to Humanities I	3 Credits
An introduction to humanities through a study of seven major arts including film, drama, music, literature, painting, sculpture, and architecture. Each of these arts is considered from the perspective of historical development, the elements used in creating works of art, meaning and form, and criticism and critical evaluation.		
HUM 111	Gateway to the Humanities	3 Credits
Through five distinct modules, students discover answers to all of the following questions: What attributes are irreducibly human - that is, independent of gender, race, culture, society, nationality, or philosophy? How do human beings relate to one another? How do we humans express ourselves? In what ways do we limit ourselves? The student will explore: philosophy/religion; language/linguistics; history; art and architecture; law and ethics; and literature/performance. Students will seek out applications of the humanities to chosen disciplines.		
HUM 210	Communicating Diversity	3 Credits
Communicating Diversity is a lower division course designed to familiarize students with the fundamentals of diversity and how those are expressed through communication. Students will develop a deep understanding of the way in which we communicate race, gender, class, sexual orientation, nationality, religion, and physical/mental ability and how it impacts our daily lives. This course will take an intersectional approach to understanding diversity and seek communication strategies for inclusivity. Emphasis will be placed on defining and developing the critical thinking skills necessary to push past oppression, marginalization, and other issues centralized around diverse populations. Students will be encouraged to investigate and discover diversity issues, solutions, and concepts at the local and global level using case studies, current events, and other significant moments in history.		
MUS 101	Music Fundamentals	3 Credits
Notation, terminology, intervals, and scales. Designed to furnish a foundation for musicianship. Recommended for teachers in public schools and all others desiring a basic music background.		
MUS 121	Music Appreciation	3 Credits
The historical and cultural background of music and origins to the twentieth century.		
MUS 125	History of Rock Music	3 Credits
The history and stylistic development of rock from its origins, through transitions, and subsequent revolutions.		
PHIL 101	Intro to Philosophy	3 Credits
Basic problems in different areas of philosophy such as ethics, political theory, metaphysics, and epistemology.		
PHIL 102	Critical Thinking	3 Credits
Covers non-symbolic introduction to logical thinking in everyday life, law, politics, science, advertising; common fallacies; and the uses of language, including techniques of persuasion.		
PHIL 135	Introduction to Ethics	3 Credits
Introduction to Ethics: critical introduction to classical and modern ethical theories such as utilitarianism, deontology, and virtue ethics. Emphasis throughout on applying the theories in various contexts such as social, political, or interpersonal. The ultimate goal will be to allow students to clarify their own thinking and positions on important ethical issues confronting society today.		
SPAN 111	First Year Spanish I	3 Credits
Development of language skills through practice in listening, speaking, reading, writing, and structural analysis. Language practice required.		

SPAN 112	First Yr Spanish II	3 Credits
A continuation of SPAN 111. Language practice required.		
SPAN 211	Second Year Spanish I	3 Credits
Considers structural review, conversation and writing, and readings in modern literature.		
THTR 100	Introduction to Theatre	3 Credits
A survey of the basic principles, facts, and theories providing an understanding of the art of theatre. Course also includes a special focus on the practical technical aspects of the theatre and on live theatre experiences.		
THTR 105	Introduction to Acting I	3 Credits
Examines acting fundamentals and focuses on development of vocal, physical, and creative tools to be used on stage.		
THTR 121	Stage Makeup	3 Credits
This course focuses on the history of makeup and basic approaches to applying make-up for the stage and screen. Make-up supplies will be studied, as well as techniques for corrective, old-age, character, stylized, and special effects makeup.		
THTR 204	Theatre Technology I	3 Credits
Lecture and discussion encompassing the philosophy and techniques of technical theatre.		
WELD 200	Metal Art	3 Credits
This course is designed to give the student the basic understanding of two dimensional 2D and three-dimensional 3D metal art. Also covered in this course we will discuss different Cutting, Welding and metal finishing techniques that are used in this discipline as it relates to metal art.		
Technology		
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).		
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 BUS 110 3 ELM 112 3.5 ELM 120 3 ELM 121 2 ELM 122 4 ELM 124 2 ELM 128 2 ELM 141 2 ELM 142 2.5 English/Communications* 3 Humanities/Fine Arts* 3 Mathematics* 3 PSC 101 3 TOTAL 38 *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 133 4 ELM 132 2 ELM 134 2.5 ELM 135 1 ELM 136 2.5 ELM 143 3 English/Communications* 3 Science* 3 TOTAL 32 *Choose with advisor