

# ELA INSTITUTE FOR FACILITY MANAGEMENT EDUCATION

## SPRING 2024

Building Operators' Certificate  
Facility Maintenance Certificate  
HVAC Continuing Education  
Electrical Continuing Education

**NEW**

Assistant Project Manager Certificate



*Operated by*



The Electric League of Arizona



The Arizona Heat Pump Council

*Sponsored by*



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# ELA Institute for Facility Management Education

**The Institute** - The ELA Institute for Facility Management Education offers educational programs to meet the unique continuing educational and training needs of facility managers and their personnel. The ELA Institute is operated by the Educational Departments of the Electric League of Arizona and the Arizona Heat Pump Council. The curricula for the Institute's educational programs were developed by industry practitioners and educators, associated with the ELA and the AHPC, the lead instructors for both organizations, and the Energy Efficiency Department at APS. These programs are designed for a wide range of facility management personnel, including maintenance technicians, and managers of large, complex, multi-facility organizations.

**The Electric League of Arizona** - The Electric League of Arizona founded in 1960 is a statewide, multi-industry trade association supporting the electrical, HVACR and energy management industries through education; publications, including trade and consumer newspapers and Buyers' Guide; consumer referral services and other utility trade ally programs. The Electric League of Arizona also provides the HVACR Continuing Education Program offered by the Arizona Heat Pump Council and the Electrical Continuing Education Program offered in conjunction with GateWay Community College.

The ELA Institute for Facility Management Education opened its doors in the fall of 2002 with the first Facility Maintenance Technician Program. To date, The Institute has graduated over 965 students in this program. These students represent over 300 companies throughout the state of Arizona. The Building Operators' Certificate Program was added to the Institute in the fall of 2003. The Institute has registered over 250 students in this program, representing about 150 companies state wide. The Institute's instructors are expert practitioners in their specific field and bring a wealth of up to date knowledge to each class.

## Building Operators' Certificate Program

The ELA Institute for Facility Management Education presents an educational program leading to a certificate in Building Operations. The certificate will be of most benefit to managers with total responsibility for multi-facilities, as well as those with single facility responsibility.

The Faculty is composed of the lead instructors for the Education Departments of the Electric League of Arizona and the Arizona Heat Pump Council; APS energy personnel; SRP energy personnel; and guest instructors, as appropriate. The program is offered eight hours a day, one-day a week for 8 weeks at the ELA Institute located in the Electric League of Arizona Education Center.



Courses now being offered a la carte. Participants have the option to register for the full certificate at a reduced price or register for standalone courses and create a course calendar that fits your schedule.

## Course Coverage

### FME 101

#### HVAC FUNDAMENTALS IN A COMMERCIAL/INDUSTRIAL FACILITY

Date: Wednesday, March 13, 2024  
Fees: \$135 Mbr / \$165 Non-Mbr  
Time: 9:00 AM - 12:00 PM

**Course Description:** A discussion of commercial systems, chiller systems, and A/C control systems in a modern industrial setting.

**Course Content:** A discussion of types of systems and controls working with application sequences, energy efficiency, diagrams and specific HVAC Controls.

- Reviews heating, cooling, and ventilation
- Commercial systems and their applications
- Commercial condensers, evaporators and compressors
- Centrifugal, screw, scroll and reciprocating applications
- Types of chillers and their applications
- A/C Control Systems
- Work with specific systems diagrams
- Chiller Systems
- Specific HVAC Controls
- KW per ton and energy usage

### FME 102

#### AIRFLOW DYNAMICS FOR THE COMMERCIAL/INDUSTRIAL FACILITY

Date: Wednesday, March 13, 2024  
Fees: \$135 Mbr / \$165 Non-Mbr  
Time: 1:00 PM - 5:00 PM

**Course Description:** A thorough understanding of airflow dynamics can enable you to uncover and resolve system problems.

**Course Content:** An overview of what causes most airflow related problems and how they can be prevented.

- Airflow dynamics
- Central air systems
- Airflow systems and components
- Variable speed fans and pumps
- Ventilation requirements for HVAC
- Types of fans
- Airflow testing and instruments

### FME 103

#### HVAC CODES AND SAFETY FOR THE COMMERCIAL/INDUSTRIAL FACILITY

Date: Wednesday, March 20, 2024  
Fees: \$135 Mbr / \$165 Non-Mbr  
Time: 9:00 AM - 11:00 AM

**Course Description:** A discussion of local and national health, safety, energy and environmental codes as they relate to the HVAC system in a Commercial/Industrial Facility.

**Course Content:** An overview of codes, standards and specifications and how they apply in a Commercial/Industrial Facility.

- EPA Codes
- Mechanical Codes

**Note:** Course fees include a copy of the 2021 International Mechanical Codebook.

### FME 104

#### ELECTRICAL CODES AND STANDARDS FOR THE COMMERCIAL/INDUSTRIAL FACILITY

Date: Wednesday, April 3, 2024  
Fees: \$270 Mbr / \$300 Non-Mbr  
Time: 9:00 AM - 5:00 PM

**Course Description:** Electrical, energy management and related codes that facility managers must know.

**Course Content:** Compliance with the most important maintenance related codes and their application to an energy efficient building.

- 2023 National Electrical Codes

**Note:** The standalone course fees include a copy of the 2023 NFPA 70 National Electrical Codebook.

"Since adding the Building Operator & Facility Maintenance certificates to my resume, I have nearly doubled my income during the big recession!"

Eric Collins  
Facility Maintenance  
Honolulu Airport



# Course Coverage continued

## FME 106

### ELECTRICAL SAFETY FOR THE COMMERCIAL/INDUSTRIAL FACILITY

Date: Wednesday, April 10, 2024  
Fees: \$270 Mbr / \$300 Non-Mbr  
Time: 9:00 AM - 5:00 PM

**Course Description:** A discussion of commercial facility safety practices as it relates to electrical systems.

**Course Content:** An overview of safety practices related to electricity and how it relates to the Commercial/Industrial Facility.

- Recommended safety practices
- OSHA Codes

**Note:** Course fees include a copy of the 2024 NFPA 70E.

## FME 107

### LIGHTING FUNDAMENTALS AND EFFICIENCY FOR THE COMMERCIAL/INDUSTRIAL FACILITY

Date: Wednesday, April 17, 2024  
Fees: \$195 Mbr / \$225 Non-Mbr  
Time: 9:00 AM - 5:00 PM

**Course Description:** A broad-based discussion of lighting fundamentals and efficiency and how they're applied to a Commercial/Industrial Facility.

**Course Content:** An overview of the Lighting Industry.

- Lighting fixture technology and efficiency
- Applications and Strategies
- Light Source/Efficiency/Common Retrofits
- Lighting maintenance

## FME 108

### POWER QUALITY FOR THE COMMERCIAL/INDUSTRIAL FACILITY

Date: Wednesday, April 24, 2024  
Fees: \$195 Mbr / \$225 Non-Mbr  
Time: 9:00 AM - 5:00 PM

**Course Description:** The basics of important, "Need to know" power quality issues in your facility. Learn as the instructor performs a real, hands-on analysis of a large facility.

**Course Content:** An overview of what causes most Power Quality related problems and how they can be prevented.

- Techniques for identifying PQ symptoms
- Trouble-shooting common problems

## FME 109

### INDOOR AIR QUALITY FOR THE COMMERCIAL/INDUSTRIAL FACILITY

Date: Wednesday, March 27, 2024  
Fees: \$135 Mbr / \$165 Non-Mbr  
Time: 1:30 PM - 5:00 PM

**Course Description:** The purpose of this course is to familiarize the attendees with Indoor Air Quality (IAQ) and Indoor Environmental Quality (IEQ).

**Course Content:** This course will familiarize attendees with common IEQ issue and terminology. Attendees will receive and introduction on how to anticipation, recognition, prevention and responses to common IEQ issues that impact the facilities. Attendees will receive an:

- Introduction to common contributors to poor IEQ.
- Familiarization with the common IEQ terms.
- Introduction to broadly applicable prevention, assessment and response concepts.
- Comprehension of the health effects, building consequences and other liabilities associated with poor or mismanaged IEQ.
- Acquaintance with example preventative actions, such as controlling outside air, regular HVAC filter replacement, managing pests, addressing water releases, reducing Legionella in water systems, etc.
- Understanding of various response actions to IEQ issues such as asbestos releases, sewer line breaks, COVID-19 positive occupants, visible mold growth, odor complaints, sick occupants, Legionellosis outbreaks, chemical releases, etc.

## FME 110

### ENERGY CONSERVATION TECHNIQUES

**Course Description:** The use of energy in commercial buildings and how to identify and prioritize conservation opportunities.

**Course Content:** An overview of the basics of energy accounting, evaluation of fuel options, operation and maintenance strategies to improve efficiency, and energy management planning techniques.

- Implementing an effective energy management program
- Use of infrared technology to measure thermal losses
- Developing an energy efficiency "checklist" for a facility
- Utility fact sheets that are customized for different facilities and energy end uses
- Sensible retrofits
- Case studies of local facilities
- Building controls • HVAC maintenance
- Efficient lighting • New technologies

## FME 111

### ENERGY AUDIT

**Course Description:** The essentials that a building operator should know about how to measure the energy performance of their facilities.

**Course Content:** An overview of where your facility uses energy and how your facilities' energy use compares to your competition.

- Find out where you spend the most

and where the most opportunities for savings exist

- Techniques for studying your energy usage history and downloading your account data into spreadsheets to analyze usage and quickly highlight important trends
- Energy end-use data that shows typical energy breakdowns for different types of facilities
- Essential for operators who manage multiple facilities

## FME 112

### DIRECT DIGITAL CONTROLS

Date: Wednesday, March 27, 2024  
Fees: \$135 Mbr / \$165 Non-Mbr  
Time: 9:00 AM - 12:30 PM

**Course Description:** An introduction to the application of Direct Digital Controls (DDC) to operating a building's temperature control system.

**Course Content:** Topics will include:

- The ability of the system to process data
- Input & output types, transducers, variable frequency drive (VFD) theory, communication protocols (LON & BACnet), programming vs. configuring controllers
- Workstation basics
- How to make the controls act like an Energy Management System (EMS).
- Specific manufacturers will not be covered, only the overall theory of how these systems operate.

## FME 115

### DESIGN & OPERATION OF COMMERCIAL CHILLED WATER SYSTEMS

Date: Wednesday, March 20, 2024  
Fees: \$135 Mbr / \$165 Non-Mbr  
Time: 12:00 PM - 5:00 PM

**What You Can Expect:** This class provides an overview of the design and operation of Building Chilled Water Systems including piping system design and unit components.

#### Piping System Design

- Direct & Reverse Return Piping Systems
- Pipe Sizing
- Piping Specialties
- Flow Control

#### Equipment

- Pumps
- Chillers
- Terminal Units (Air Handliners, Fan Coil Units, Coils)
- Cooling Towers
- Compression-Expansion Tanks



# Building Operators' Certificate Program Registration

Sponsored by 

Operated by  

Student Name: \_\_\_\_\_ Date: \_\_\_\_\_

Company: \_\_\_\_\_ Position: \_\_\_\_\_

\*\*\*E-mail: \_\_\_\_\_ Daytime Phone: \_\_\_\_\_

Mailing Address: \_\_\_\_\_ City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Contact: \_\_\_\_\_ Are you a member of the ELA?  Yes  No

\*\*\*We may use your email address to inform you of similar educational courses.

## Rates

Non-Member Rate                      Member Rate

**Full Certificate Program Registration** ..... **\$1,325** ..... **\$1,275**  
**Dates:** March 13 - May 1, 2024 (*Eight Consecutive Wednesdays*)  
**Time:** 9:00 a.m. - 5:00 p.m.  
**Location:** Electric League Training Center, 2702 N. 3rd Street Suite 2020, Phoenix, AZ 85004

### À la Carte Course Registration

- FME 101** HVAC Fundamentals for the Commercial/Industrial Facility ..... \$165 ..... \$135
- FME 102** Airflow Dynamics for the Commercial/Industrial Facility..... \$165 ..... \$135
- FME 103** HVAC Codes & Safety for the Commercial/Industrial Facility ..... \$165 ..... \$135
- FME 104** Electrical Codes & Standards for the Commercial/Industrial Facility..... \$300 ..... \$270
- FME 106** Electrical Safety for the Commercial/Industrial Facility ..... \$300 ..... \$270
- FME 107** Lighting Fundamentals and Efficiency for the Commercial/Industrial Facility ... \$225 ..... \$195
- FME 108** Power Quality for the Commercial/Industrial Facility. .... \$225 ..... \$195
- FME 109** Indoor Air Quality for the Commercial/Industrial Facility ..... \$165 ..... \$135
- FME 112** Direct Digital Controls ..... \$165 ..... \$135
- FME 115** Design & Operation of Commercial Chilled Water Systems..... \$165 ..... \$135

Sub Total \_\_\_\_\_                      Sub Total \_\_\_\_\_

- Full-day courses include continental breakfast and lunch
- Individual course registrations are offered on an enrollment contingency basis

**\*Cancellation Policy:** A full refund will be issued only if written notice of cancellation is received **seven (7) days** prior to the class start date. All registrations received by mail or fax are confirmed registrations, unless cancelled within the proper time frame. All courses are subject to cancellation if minimum enrollment requirements are not met. No-shows: participants are charged the full amount if they register but do not attend. Due to the number of classes we hold each season, we do not provide confirmation. \_\_\_\_\_ Please initial here indicating you have read and understand the cancellation policy.

### **Method of Payment** Payment must be received prior to start of class.

Total: \$ \_\_\_\_\_  Check enclosed #: \_\_\_\_\_  M/C  Visa  AMEX

Credit Card #: \_\_\_\_\_ 3 Digit Code: \_\_\_\_\_ Exp Date: \_\_\_\_\_

Exact name on card: \_\_\_\_\_ Signature: \_\_\_\_\_

Billing Address if different: \_\_\_\_\_ State: AZ Zip: \_\_\_\_\_

**REGISTER ONLINE AT: [EDU.ELAZ.ORG](http://EDU.ELAZ.ORG)**

Please mail registration and payment to: Arizona Heat Pump Council • 2702 N. 3rd Street, Suite 2020  
 Phoenix, AZ 85004 Or fax to: 602-274-0029 • Call 602-263-0115 for more information



# ELA Institute for Facility Management Education

## Facility Maintenance Technician Program

**About the Program:** Sponsored by 

Operated by  

This program has been designed by industry educators and practitioners, associated with the Electric League of Arizona's education department and the Arizona Heat Pump Council. This session will be taught by one of the League's electrical instructors and a lead instructor for the Arizona Heat Pump Council education program. Upon completion of this 16 week 2 nights a week program, successful students will receive a Certificate of Completion and Facility Maintenance Master Technician Patches. (A "C" average or better is required for successful completion.)

### Course Coverage

(Order and content is subject to change)

#### HVAC Curriculum:

The HVAC training will include a comprehensive review of Refrigeration System fundamentals, refrigerants, HVAC Equipment, air movement and measurement, air quality, residential and commercial systems, air & water source heat pumps.

- Refrigeration Theory I
- Refrigeration Theory II
- Refrigeration Components
- Introduction to Refrigerants
- Charging & Piping
- A/C Control Systems I
- A/C Control Systems II
- Review & Quiz
- Refrigerators & Freezers
- Residential Systems - Air Conditioning
- Residential Systems - Heat Pumps
- Commercial Systems
- Air Quality & Distribution (Air Flow)
- HVAC Systems Troubleshooting
- Servicing Commercial Systems
- Review & Final Exam

#### Electrical Curriculum:

The electrical training will include a comprehensive review of basic electrical fundamentals; practical installation, operation, maintenance, and troubleshooting techniques, with an emphasis on electrical safety procedures.

- Concepts of Electricity I
- Concepts of Electricity II
- Basic Circuitry I
- Basic Circuitry II
- Basic Circuitry III
- Commercial & Industrial Buildings Practical AC Circuits
- Commercial & Industrial Practical AC Power Delivery
- Building Systems Control Systems
- Electrical Codes & Standards
- Basic AC/DC Rotating Electrical Machinery
- Variable Frequency Drive Systems I
- Variable Frequency Drive Systems II
- Electrical Power Quality Commercial & Industrial
- Electrical Troubleshooting I
- Electrical Troubleshooting II
- The Importance of Electrical Safety

### Facility Maintenance Program Registration

**Tuition** (Space is limited register early) (Tuition includes all books and applicable fees)

**\$995 ELA Member/\$1,045 Non-Member • Contact the Institute for more information at 602-263-0115**

**Dates: January 16 - May 9, 2024 • Tuesdays & Thursdays • Time: 5:30 p.m. - 8:20 p.m.**

**Location: Electric League Training Center, 2702 N. 3rd Street Suite 2020, Phoenix, AZ 85004**

**HVAC Program: Tuesdays • Electrical Program: Thursdays**

Student Name: \_\_\_\_\_ Date: \_\_\_\_\_

Company: \_\_\_\_\_ Contact person: \_\_\_\_\_

Daytime Phone: \_\_\_\_\_ \*\*E-mail: \_\_\_\_\_ \*\*Fax: \_\_\_\_\_

Mailing Address: \_\_\_\_\_ City: \_\_\_\_\_ State: AZ Zip: \_\_\_\_\_

Are you a member of the Electric League of Arizona?  Yes  No

**Method of Payment: Payment must be received prior to start of class.**

Total: \$ \_\_\_\_\_  Check enclosed #: \_\_\_\_\_  M/C  Visa  AMEX

(All credit card receipts will be sent to the email address you provide above.)

Credit Card #: \_\_\_\_\_ 3 Digit Code: \_\_\_\_\_ Exp Date: \_\_\_\_\_

Exact name on card: \_\_\_\_\_ Signature: \_\_\_\_\_

Billing Address if different: \_\_\_\_\_ State: AZ Zip: \_\_\_\_\_

**Cancellation Policy:** A full refund will be issued only if written notice of cancellation is received **seven (7) days** prior to the class start date. All registration received by mail, or fax are confirmed registrations, unless cancelled within the proper time frame. All courses are subject to cancellation if minimum enrollment requirements are not met. **No-shows:** participants are charged the full amount if they register but do not attend. Due to the number of classes we hold each season, we do not provide confirmation. \_\_\_\_\_ Please initial here indicating you have read and understand the cancellation policy.

\*\*We may use this fax number or email address to inform you of similar educational courses.

**Please return application and fees to:**  
**Electric League of Arizona - 2702 N. 3rd Street Ste. 2020, Phoenix, Arizona 85004**  
**Fax 602-274-0029 or call 602-263-0115 for more information.**

**REGISTER ONLINE AT: [EDU.ELAZ.ORG](http://EDU.ELAZ.ORG)**



# ELA Institute for Facility Management Education

## Facility Management General Studies

The ELA Institute for Facility Management Education presents its General Studies continuing education program. The General Studies Program was developed to meet the unique training needs of facility maintenance personnel who wish to participate in continuing education on an individual course basis to refresh existing job skills or learn new skills. Students interested in more structured curricula may wish to consider the Institute's Certificate programs.

### Courses

#### HPC 101

##### REFRIGERATION THEORY & SYSTEMS DIAGNOSIS

Dates: March 4 & 6, 2024  
Fees: \$127 Mbr/\$157 Non-Mbr  
Time: 6:00 p.m. - 9:30 p.m.

**What You Can Expect:** This course will review mechanical refrigeration theory and system troubleshooting. The four basic components, reversing valves, superheat, sub-cooling, sensible heat, latent heat and BTU's are all reviewed. This course will focus on heat pump operation and diagnosis. If you do not have service experience and/or refrigeration training, Refrigeration Fundamentals is a recommended prerequisite.

#### HPC 102

##### CHARGING, PIPING, & DEHYDRATION

Dates: March 14, 18 & 20, 2024  
Fees: \$149 Mbr/\$179 Non-Mbr  
Time: 6:00 p.m. - 9:30 p.m.

**What You Can Expect:** Did you know factory studies of failed compressors show a large amount of compressor failures are caused by improper refrigerant levels? This is not a well-known fact in our industry. Refrigerant charge imbalances cause slow degradation of the compressor bearings, valves and motor windings. This results in compressor failures occurring some time after the charge becomes unbalanced, making the connection between refrigerant levels and malfunctions difficult. Improper piping and contaminants are also big offenders.

#### HPC 103

##### ELECTRICAL FUNDAMENTALS FOR HEAT PUMPS

Dates: March 26 & 28, 2024  
Fees: \$121 Mbr/\$151 Non-Mbr  
Time: 6:00 p.m. - 9:30 p.m.

**What You Can Expect:** This class will focus on basic electricity as it pertains to heat pump operations. Topics to be covered include basic electron theory, electromagnetism and PSC motor theory. You will understand how compressors run and start systems work. Having an understanding of capacitor and potential relay operation on an electron level can help the service technician diagnose and avoid malfunctions that are commonly overlooked.

#### HPC 104

##### CONTROL SYSTEMS FOR HEAT PUMPS

Dates: April 2 & 4, 2024  
Fees: \$121 Mbr/\$151 Non-Mbr  
Time: 6:00 p.m. - 9:30 p.m.

**What You Can Expect:** Participants will attain the knowledge to design an entire electrical system for a residential heat pump. You will also learn the theory of operations and diagnostics of heat pump control circuitry including calibration and testing of common brands of thermostats, cooling and heating anticipation circuits, and commonly used electromechanical and electronic defrost systems.

#### HPC 106

##### HVAC CODE & SAFETY

Dates: April 9 & 11, 2024  
Fees: \$223 Mbr/\$253 Non-Mbr  
Times: 6:00 p.m. - 9:30 p.m.

**What You Can Expect:** This class is designed to make you more comfortable with the International Residential Code. In this interactive class, popular code issues and interpretations will be discussed. Come prepared to discuss your personal experiences with the Code.

#### HPC 107

##### AIRFLOW DYNAMICS

Dates: April 16 & 18, 2024  
Fees: \$121 Mbr/\$151 Non-Mbr  
Time: 6:00 p.m. - 9:30 p.m.

**What You Can Expect:** Airflow is one of the most critical issues for customer comfort. Many comfort complaints and improper system operation problems are a result of poor air distribution. A thorough understanding of airflow dynamics can enable you to uncover and resolve system problems. This course will help you identify inadequate or excessive airflow issues. It will help you solve complaints of hot spots, drafts, noises and stale air. Frequently airflow problems can be easily solved by a minor adjustment or changing to a better register.

#### HPC 147

##### COMMERCIAL REFRIGERATION

Dates: May 16, 2024  
Fees: \$108 Mbr/\$138 Non-Mbr  
Time: 5:00 p.m. - 8:00 p.m.

**What You Can Expect:** This course will discuss commercial refrigeration systems, including walk-in refrigerators and freezers. Operating conditions, refrigerants and refrigerant selection will be reviewed. The focus will be on wiring, defrost control and operating strategies, and we will discuss refrigeration theory as it applies to product cooling. Mechanical and electrical troubleshooting will also be covered.

#### HPC 156

##### VARIABLE FREQUENCY DRIVES

Dates: May 14, 2024  
Fees: \$108 Mbr/\$138 Non-Mbr  
Times: 5:30 p.m. - 9:00 p.m.

**What You Can Expect:** An overview of modern AC VFD design and component layout. An overview of AC Induction Motors and how they work with VFDs. How motors in variable fan and pump applications correspond to fan/pump affinity laws, how this saves energy and why VFDs are used for these purposes.

#### HPC 165

##### DESIGN & OPERATION OF COMMERCIAL CHILLED WATER SYSTEMS

Dates: May 6 & 8, 2024  
Fees: \$119 Mbr/\$149 Non-Mbr  
Times: 5:00 p.m. - 8:00 p.m.

**Note:** Students who have completed the Facility Maintenance Technician Program can complete the FME 115 version of this course for an Advanced Course Certificate of Completion in Facility Management Studies.

**What You Can Expect:** This two-session class provides an overview of the design and operation of Building Chilled Water Systems.

##### Course Content:

Class 1: Piping System Design

- A. Direct & Reverse Return Piping Systems
- B. Pipe Sizing
- C. Piping Specialties
- D. Flow Control

Class 2: Equipment

- A. Pumps
- B. Chillers
- C. Terminal Units
- D. Cooling Towers
- E. Compression-Expansion Tanks



# HVAC Course Registration

Student Name: \_\_\_\_\_ Date: \_\_\_\_\_

Company: \_\_\_\_\_ Position: \_\_\_\_\_

\*\*\*E-mail: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Daytime Phone: \_\_\_\_\_ \*\*\*Fax #: \_\_\_\_\_

Person/Company responsible for payment: \_\_\_\_\_ Contact: \_\_\_\_\_

Are you a member of the ELA?  Yes  No

\*\*\*We may use this fax number or email address to inform you of similar educational courses.

(All credit card receipts will be sent to the email address you provide above.)

Rates	Non-Member Rate	Member Rate
<input type="checkbox"/> <b>HPC 101</b> Refrigeration Theory & Systems Diagnosis . . . . .	\$157 . . . . .	\$127
<input type="checkbox"/> <b>HPC 102</b> Charging, Piping & Dehydration . . . . .	\$179 . . . . .	\$149
<input type="checkbox"/> <b>HPC 103</b> Electric Fundamentals for Heat Pumps . . . . .	\$151 . . . . .	\$121
<input type="checkbox"/> <b>HPC 104</b> Control Systems for Heat Pumps . . . . .	\$151 . . . . .	\$121
<input type="checkbox"/> <b>HPC 106</b> HVAC Code & Safety. . . . .	\$253 . . . . .	\$223
<input type="checkbox"/> <b>HPC 107</b> Airflow Dynamics . . . . .	\$151 . . . . .	\$121
<input type="checkbox"/> <b>HPC 147</b> Commercial Refrigeration. . . . .	\$138 . . . . .	\$108
<input type="checkbox"/> <b>HPC 156</b> Variable Frequency Drives . . . . .	\$138 . . . . .	\$108
<input type="checkbox"/> <b>*HPC 165</b> Design & Operation of Commercial Chilled Water Systems. . . . .	\$149 . . . . .	\$149
<input type="checkbox"/> *I have completed the Facility Maintenance Technician Program and want a certificate of completion for this course.		

The Heat Pump Council provides appetizers & beverages served from 5:30 p.m. - 6:00 p.m.

### Cancellation Policy and No-Shows

A full refund will be issued as long as **written notice is received 48 hours prior** to the class starting time. Due to the number of courses held and registrations received, we do not provide written or verbal confirmation. Returned checks are subject to a \$30.00 returned check fee. **All registrations received by mail or fax are confirmed registrations unless cancelled within the proper time frame or unless notification of full or cancelled classes is received from the Arizona Heat Pump Council.**

**Participants are charged the full fee amount if they register but do not attend. There are no refunds for no-shows.**

**\*\* \_\_\_\_\_ Please initial here to indicate you have read, understood, and agreed to this cancellation policy.**

**Method of Payment** Payment must be received prior to start of class.

Total: \$ \_\_\_\_\_  Check enclosed #: \_\_\_\_\_  M/C  Visa  AMEX

Credit Card #: \_\_\_\_\_ 3 Digit Code: \_\_\_\_\_ Exp Date: \_\_\_\_\_

Exact name on card: \_\_\_\_\_ Signature: \_\_\_\_\_

Billing Address if different: \_\_\_\_\_ State: AZ Zip: \_\_\_\_\_

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Please mail registration and payment to: Arizona Heat Pump Council • 2702 N. 3rd Street, Suite 2020  
Phoenix, AZ 85004 Or fax to: 602-274-0029 • Call 602-263-0115 for more information



# GO TO THE HEAD OF YOUR FIELD With These Certificate Programs

Register at the Electric League, attend most classes at Gateway Community College

## RESIDENTIAL WIRING CERTIFICATE

**Prerequisites:** None

**Description:** This certificate program is specifically designed to provide a foundation of fundamental electrical knowledge and skills in residential applications. These include use of tools, applied calculations, theories and concepts of electricity and electronics, residential wiring and codes. The Certificate of Completion (CCL) lays the framework for the International Code Council (ICC) and International Association of Electrical Inspectors (IAEI) certification exams. Students are admitted to the Certificate of Completion (CCL) in Electrical Technology-Residential Wiring Program only through the Electric League of Arizona. Upon successful completion, the student will be prepared to progress to the Commercial Wiring Certificate Program.

**Required Courses:**

- ELC 103 Electrical/Mechanical Calculations
- ELC 119 Concepts of Electricity & Electronics
- ELC 123 Residential Electrical Wiring & Codes
- ELC 160 Applied Electrical Codes
- ELC 164 Grounding & Bonding

## COMMERCIAL WIRING CERTIFICATE

**Prerequisites:** Completion of the Residential Wiring Certificate Program or permission of instructor.

**Description:** This Certificate Program builds upon your knowledge of residential applications and provides you with greater depth in skills and commercial electrical applications. Upon successful completion of the series you will be awarded a Certificate of Completion and will be prepared to advance to the Industrial Wiring Certificate Program.

**Required Courses:**

- ELC 120 Solid State Fundamentals
- ELC 161 Applied Electrical Codes II
- ELC 217 Electric Motor Controls
- ELC 125 Commercial Electrical Wiring & Codes

## INDUSTRIAL WIRING CERTIFICATE

**Prerequisites:** Completion of Commercial Certificate Program or permission of the instructor.

**Description:** This Certificate Program continues to develop your knowledge of advanced electrical skills, typical of industrial applications. Upon successful completion of this series you will be awarded a Certificate of Completion and will be prepared to advance to the Electrical Technology Associate's degree program.

**Required Courses:**

- ELC 124 Industrial Wiring and Codes
- ELC 144 Basic Automated Systems Using Programmable Controllers
- ELC 210 AC/DC Machinery
- ELC 218 Variable Frequency Drives

## CERTIFICATE OF COMPLETION IN ELECTRICAL TECHNOLOGY

**Description:** This Electrical Technology Program is designed to provide students with a broadened educational background and leadership skills in facilities management. This expertise will allow employment within the industry in the areas of management, sales, field service, business ownership or instruction.

**Requirements:** Completion of the Electrical Technology Wiring Certificate Program in Residential Wiring, Commercial Wiring, and Industrial Wiring (39 Credits Total)

## ASSOCIATE OF APPLIED SCIENCE IN ELECTRICAL TECHNOLOGY

(Issued by GateWay Community College)

**Requirements:** 60-64 Credits Total  
2.0 GPA Overall

**Technical Program:** 39 Credits

**General Studies:** 22-25

**Classes** **Credits**

**Technical Program:**

- ELC 144 Basic Automated Systems Using Programmable Controllers . . . . . 3
- ELC 119 Concepts of Electricity & Electronics . . . . . 3
- ELC 120 Solid State Fundamentals . . . . . 3
- ELC 123 Residential Electrical Wiring & Codes . . . . . 3
- ELC 124 Industrial Electrical Wiring & Codes . . . . . 3
- ELC 125 Commercial Electrical Wiring & Codes . . . . . 3
- ELC 160 Applied Electrical Codes . . . . . 3
- ELC 161 Applied Electrical Codes II . . . . . 3
- ELC 164 Grounding & Bonding . . . . . 3
- ELC 210 AC/DC Machinery . . . . . 3
- ELC 217 Electric Motor Controls . . . . . 3
- ELC 218 Variable Frequency Drives . . . . . 3
- ELC 103 Electrical/Mechanical Calculations . . . . . 3

**General Studies:**

- ENG 101 First Year Composition . . . . . 3
- ENG 111 Technical Writing . . . . . 3
- COM 230 Small Group Communication . . 3
- CRE 101 Critical Reading  
(Or equivalent by assessment) . . 3
- MAT 122 Intermediate Algebra  
(Or equivalent by assessment) . . 3
- HUM 101 General Humanities . . . . . 3
- CHM 130 Fundamental Chemistry . . . . 3
- CHM 130LL Fundamental Chemistry . . . 3
- SOC 101 Introduction to Sociology . . . 3

**Cancellation Policy**  
A full refund will be issued only if written notice of cancellation is received 7 days prior to class starting date. All classes subject to cancellation if minimum enrollment requirements are not met. Financial aid students must pay ELA the full fee and claim back the financial aid from Gateway.





# Electrical Courses

Unless noted, ELC classes earn three college credits and meet once a week. A \$15 Gateway registration fee applies per student. Textbooks are additional and may be purchased from the publisher or online retailer.

**\*\*NOTE: Students must be properly admitted to GateWay College and meet the enrollment criteria to register for ELC courses.**

## 16-Week Classes

\*College-accredited

### ELC 160 APPLIED ELECTRICAL CODES I

Dates: Jan. 23 - May 7, 2024  
Time: 6:00 p.m. - 9:10 p.m.  
Instructor: Mark Cook  
Fees: \$348 Mbr/\$384 Non-Mbr

Analysis of diagrams and application of current code interpretations. Includes local exceptions and practices. Review of the National Electrical Code (NEC) related to definitions, installations, wiring and protection, wiring methods, materials, and equipment.

**Who Should Attend:** This course is of great value to the electrical apprentice, journeyman, contractor or anyone seeking to improve their "Code" knowledge.

**Prerequisites:** A grade of C or better in ELC119 or permission of Instructor.

### ELC 124 INDUSTRIAL ELECTRICAL WIRING & CODES

Dates: Jan. 22 - May 6, 2024  
Time: 5:50 p.m. - 9:15 p.m.  
Instructor: Brian Moen  
Fees: \$348 Mbr/\$384 Non-Mbr

Industrial electrical power techniques of low medium and high voltage systems. Selection of electrical distribution components, single and three phase systems, one-line diagrams, motors, transformers, protective devices, power factor, demand factor, conductor selection, system planning, and energy management.

**Who Should Attend:** This class will help upgrade the skills of those journeyman and apprentices who are competent commercial wiremen

**Prerequisites:** A grade of C or better in ELC 123 or permission of the Instructor.

### ELC 119 CONCEPTS OF ELECTRICITY & ELECTRONICS

Dates: Jan. 24 - May 8, 2024  
Time: 6:00 p.m. - 9:10 p.m.  
Instructor: TBD  
Fees: \$348 Mbr/\$384 Non-Mbr

Introduction to theory and principles of electric circuits, magnetism and electro-magnetism including basic motors, transformers and generators. Use of basic measuring instruments. Overview of Ohm's and Kirchhoff's law and electronics in the modern world.

**Who Should Attend:** Highly recommended for entry level electrical workers, utility and distributor personnel or anyone wanting to understand the basics of electricity.

**Prerequisites:** None

### ELC 217 ELECTRIC MOTOR CONTROLS

Dates: Jan. 25 - May 9, 2024  
Time: 6:00 p.m. - 9:10 p.m.  
Instructor: Marc Ramirez  
Fees: \$348 Mbr/\$384 Non-Mbr

Electrical symbols, line diagrams and logic. Contacts and starters, control devices, reversing circuits and power distribution systems. Magnetism and magnetic solenoids, reduced voltage starters, and circuits. Hand tools and safety procedures.

**Who Should Attend:** If you design, sell, install, or troubleshoot electrical controlled systems, this class will benefit you.

**Prerequisites:** None

## 2-Day Seminars

\*Non-College Credit

### ELA 30 INTRODUCTION TO PHOTOVOLTAIC/SOLAR POWER INSTALLATION

Dates: Thurs., May 16 & Fri., May 17  
Time: 8:00 a.m. - 4:00 p.m.  
Fees: \$348 Mbr/\$384 Non-Mbr

(Fees include breakfast, lunch and hand-outs). Embark on a comprehensive journey into the world of solar power. This entry-level seminar is designed to give you a general understanding of the various solar power systems and components behind the design and installation of solar systems. Includes hands-on learning and technical expertise.

- Master the principles of Photovoltaic (PV) technology.
- Apply system design and sizing techniques for residential and commercial applications.
- Assemble and test a solar power system.

## One-Day Seminars

\*Non-College Credit at ELA Training Cntr.

### ELA 13 NEC CODE UPDATE

Offering I: Wednesday, April 3, 2024  
Offering II: Saturday, May 11, 2024  
Time: 9:00 a.m. - 5:00 p.m.  
Fees: \$270 Mbr/\$300 Non-Mbr

This full-day class will cover modifications in the NEC and discuss why the rule changes were made. Topics also include safety aspects of the NEC changes, conflicting rule changes, how to apply rule changes to real-world projects, and how the rule changes affect overhead costs.

**Note:** Course fees include a copy of the 2023 National Electric Codebook and lunch. (\$50 off for those w/Codebooks)

### ELA 40 ELECTRICAL GROUNDING & BONDING

Dates: Friday, May 5, 2024  
Time: 8:00 a.m. - 4:00 p.m.  
Fees: \$270 Mbr/\$300 Non-Mbr

(Fees include breakfast, lunch and handouts). This one-day seminar will allow participants to interpret code requirements as they relate to Article 250 and other articles of the NEC. Participants will be provided with an in-depth review from theory to important principles of grounding and bonding.

- Explore the performance goals of grounding
- Know when to ground and when not to ground
- Examine key terms to identify specific Code requirements
- Look at qualifying grounding electrodes and the installation requirements

**Who Should Attend:** Highly recommended for entry level electrical workers, maintenance technicians, engineers, building managers or anyone wanting a better understanding of grounding and bonding.

**Note:** Fees include a copy of the 2023 NEC.

### ELA 70 ELECTRICAL SAFETY FOR COMMERCIAL/INDUSTRIAL FACILITIES

Date: Wednesday, April 10, 2024  
Time: 9:00 a.m. - 5:00 p.m.  
Fees: \$270 Mbr/\$300 Non-Mbr

(Fees include breakfast, lunch and hand-outs). This full-day class will cover an overview of NFPA 70E including: Arc Flash & Arc Blast Hazards, Flash Protection & approach boundaries, Hazard Risk Categories & selection of appropriate PPE. Lockout Tagout procedures, general Electrical Safety related to electricity in Commercial and Industrial facilities. Recommended Safety practices and OSHA Codes.

**Who Should Attend:** Highly recommended for Facility Maintenance Technicians and Building Operators, Electricians, HVAC technicians and their Supervisors.

**Note:** Fees include a copy of NFPA 70E 2024.

Please Remember  
Register Early to  
avoid  
disappointments  
REGISTER ONLINE  
AT:  
EDU.ELAZ.ORG





NEW

# Assistant Project Manager Certificate

## ELA Institute for Facility Management Education

### Assistant Project Manager for Mechanical (HVAC) & Plumbing

**About the Program:** Sponsored by 

Operated by  

This program has been designed by industry educators and practitioners, associated with the Electric League of Arizona's education department and the Arizona Heat Pump Council. Upon completion of 2-day seminar, students will receive a Certificate of Completion and have the ability to apply solutions to real-world problems. (A "C" or better is required for successful completion.)

#### Course Description

*(Order and content is subject to change)*

This seminar will provide participants with the knowledge and skills necessary to assist a Project Manager in managing all aspects of a new construction or a renovation project from mobilization or project start through testing, commissioning and hand-over to the Client.

- Communications - Contact List, Follow-Up Paths
- Follow-Up - All communications to avoid delays of materials, equipment, or subcontractor performance
- Document Control - Contract, Contract Changes, Design Drawings, Specifications, Requests for Information
- Construction Schedule - Critical Path
- Procurement - Budget, Submittals, Technical Reviews, A&E Approvals, Operating & Maintenance Instructions
- Control Log - Monitoring of all Project Manager submissions of materials, equipment, and subcontractor submittals from submission, approval, release of fabrication and delivery and confirmation of deliver to the project site
- Closeout - Creating project O&M Instruction Manual and Collecting all O&M instruction manuals,
- Project Completion - Team Performance Evaluation
- Areas of improvement starting a new project

#### Who Should Attend

Journeyman, Foremen, Superintendents that have a foundation in their trade/skillset, HVAC/Plumbing Technicians, Facility Maintenance personnel, or Assistant PMs

#### Program Registration

**Tuition** (Space is limited register early) (Tuition includes all books and applicable fees)

**\$299 ELA Member/\$349 Non-Member**

**Dates: May 17 & 18, 2024 • Friday & Saturday • Time: 8:30 a.m. - 5:00 p.m.**

**Location: Electric League Training Center, 2702 N. 3rd Street Suite 2020, Phoenix, AZ 85004**

Student Name: \_\_\_\_\_ Date: \_\_\_\_\_

Company: \_\_\_\_\_ Contact person: \_\_\_\_\_

Daytime Phone: \_\_\_\_\_ \*\*E-mail: \_\_\_\_\_ \*\*Fax: \_\_\_\_\_

Mailing Address: \_\_\_\_\_ City: \_\_\_\_\_ State: AZ Zip: \_\_\_\_\_

Are you a member of the Electric League of Arizona?  Yes  No

**Method of Payment: Payment must be received prior to start of class.**

Total: \$ \_\_\_\_\_  Check enclosed #: \_\_\_\_\_  M/C  Visa  AMEX

(All credit card receipts will be sent to the email address you provide above.)

Credit Card #: \_\_\_\_\_ 3 Digit Code: \_\_\_\_\_ Exp Date: \_\_\_\_\_

Exact name on card: \_\_\_\_\_ Signature: \_\_\_\_\_

Billing Address if different: \_\_\_\_\_ State: AZ Zip: \_\_\_\_\_

**Cancellation Policy:** A full refund will be issued only if written notice of cancellation is received **seven (7) days** prior to the class start date. All registration received by mail, or fax are confirmed registrations, unless cancelled within the proper time frame. All courses are subject to cancellation if minimum enrollment requirements are not met. **No-shows:** participants are charged the full amount if they register but do not attend. Due to the number of classes we hold each season, we do not provide confirmation. \_\_\_\_\_ Please initial here indicating you have read and understand the cancellation policy.

\*\*We may use this fax number or email address to inform you of similar educational courses.

**Please return application and fees to:  
Electric League of Arizona - 2702 N. 3rd Street Ste. 2020, Phoenix, Arizona 85004  
Fax 602-274-0029 or call 602-263-0115 for more information.**

**REGISTER ONLINE AT: [EDU.ELAZ.ORG](http://EDU.ELAZ.ORG)**





**Electric League of Arizona**  
2702 N. 3rd Street, Suite 2020  
Phoenix, AZ 85004

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## The ELA Institute's Faculty



**Mark D. Cook** - Mark is an Electrical Education Specialist at Faith Technologies University and has been in the electrical trade since 1978. His present role is providing CEU classes as well as exam prep and arc flash classes. Mark spent time in the industry working in both high-voltage and low-voltage residential, commercial and industrial occupancies. He also owned his own business from 1994 until accepting a position with Faith Technologies in 2015. He was an adjunct instructor for Independent Electrical Contractors (IEC) of AZ while teaching for the Electric League of Arizona. Mark recently passed the 7-hour Washington State Administrators exam and was appointed to Code-Making-Panel #2 in April of 2020. He also writes monthly code articles for The Electric Times.



**Derrick A. Denis, CIAQP, CAC, CIEC** - As a practitioner, inventor, educator and volunteer, Mr. Denis has provided professional environmental health and safety (EH&S), industrial hygiene (IH) and indoor environmental quality (IEQ) services for over 27 years and 20,000 projects domestically and abroad. He has served 21 years as V.P. of IEQ with the environmental consulting firm Clark Seif Clark,

Inc. Mr. Denis is an inventor of Sewer Gas Solutions, a product preventing sewer gas infiltration by inhibiting the evaporation of water from plumbing traps. Mr. Denis is currently Phoenix IAQA Chapter Director. He holds a B.S. degree in Environmental Science and numerous relevant certifications/accreditations.



**Kevin English** is a seasoned expert in the field of construction trades education with over 30 years of experience as a Career and Technical Educator in Arizona. He is renowned for his significant contributions to the education sector, particularly for developing innovative Solar Power Installation curriculum tailored for high schools. Kevin's teaching philosophy revolves around hands-on

learning, making his workshops engaging and practical learning experiences for all participants.



**Don Happ, Lighting Instructor** - Mr. Happ is the owner of D.H. Lighting Solutions, a lighting design and consultation firm for commercial, industrial and public projects. He is Past President and an instructor for the Arizona section, Illuminating Engineering Society, a CEM, certified by the EPA and holds LC certification in lighting.



**Bruce Martz** - Bruce has been in the HVAC-R industry for over 40 years, most of that in Arizona. He has an MBA, and is a licensed Certified Energy Manager as well as a licensed Certified Demand Side Manager. Bruce has work for companies such as York, Trane, "Siemens", ABM, and two local contractors, performing various roles from management, sales, and project management. He

has been and is active in several of our local industry Trade Associations. For the past five years, he has also been teaching HVAC-R and Business at Gateway Community College as a Resident Faculty Professor.



**Brian Moen** - Brian has been in the electrical industry for over 40 years, starting as an apprentice in 1979, working as a journeyman/foreman after the apprenticeship. He moved from the field into the office in 1992 as an estimator/project manager. Brian owned his own company for 12 years and is currently the Construction Manager at an Electrical, Instrumentation and Control company in the Phoenix area and has a staff of 5 Project Managers and Estimators. He has held his contractors/masters license in 12 states. Brian has taught off and on throughout his career, teaching control classes, Code classes and all years of various apprenticeship programs.



**Vic Pietkiewicz** - Mr. Pietkiewicz has over 45 years of experience in the engineering and construction industry. He is the Owner of Dove Valley Services, LLC a consultant to the construction industry. Previously he owned his own air-conditioning company. Many of his years included creating training programs for mechanical and electrical engineers, managers, estimators, construction workers, and technicians. In addition to holding a technical school certificate in AC Engineering, and a B.Sc. in Engineering Technology (HVAC) he holds three AZ Registrar of Contractors licenses and a Federal EPA license.



**Marc Ramirez** - Marc has worked in the electrical industry for over 50 years. He owned and operated Mr. Electric Service Co., Inc. located in Hicksville, New York focusing primarily on service, sold the company and retired in 2001. With over 40 years of business experience in service operations management, he was recruited by Hatfield-Reynolds Electric, an IES Company, as V.P. of Service

Operations from 2001 - 2008. He has been an adjunct faculty member of Gateway Community College teaching the third year Electrical Apprenticeship Program for the IEC Arizona Chapter from 2006 till 2017 and currently instructing for the Electric League of Arizona. He served as principle member of the NFPA National Electrical Code Panel 17 from 1993 to 2014, and an OSHA Authorized Construction 10/30 hour Trainer.



**Elmer Tepper** - Mr. Tepper entered the electrical field as an electrician and worked in this field for fifteen years. After receiving his BSEE degree, he worked in electrical engineering design and project management for a variety of industrial, commercial and institutional facilities.



**Ed Weiss, Power Quality Instructor** - Mr. Weiss has a distinguished background in Power Quality Engineering for the past nineteen years and is a published author, seminar speaker, holds two P.Q. related patents and is currently President of Applied Power Quality Solutions.