

# ELA INSTITUTE FOR FACILITY MANAGEMENT EDUCATION

## FALL 2016

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



*Operated by*



The Electric League of Arizona



The Arizona Heat Pump Council

*Sponsored by*



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# ELA Institute for Facility Management Education

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## Companies participating in ELA Institute Programs:

- |  |  |   |   |
|--|--|---|---|
| <p>107 ACS<br/>2nd Avenue Design<br/>A.G.S.I.M<br/>AAA Arizona<br/>ABC Electric<br/>ABM Engineering<br/>ACT Electric<br/>ADJC<br/>ADOT<br/>AHCCCS State of Arizona<br/>Absolute Comfort Cooling &amp; Heating, Inc.<br/>Air National Guard<br/>Air Refrigeration<br/>Air-zona Air Conditioning<br/>Ak-Chin Indian Community<br/>AKE, Inc.<br/>Alameda Electric LLC<br/>Albertsons, Inc.<br/>All Properties Services<br/>All Team<br/>America West Airlines, Inc.<br/>American Express, IPC<br/>American Italian Pasta<br/>Andrew's Refrigeration Inc.<br/>Anthem Community Council<br/>APS<br/>APSES<br/>Archie Hendricks Sr. Skilled Nursing Facility<br/>Arco Services Co. Inc.<br/>Arizona Cardinals<br/>Arizona's Children Association<br/>Arizona Comfort &amp; Refrigeration, Inc.<br/>Arizona Contractors Specialists<br/>Arizona Control Specialists, Inc.<br/>Arizona Department of Commerce<br/>Arizona Department of Corrections<br/>Arizona Department of Transportation<br/>Arizona Exposition &amp; State Fair<br/>Arizona Game &amp; Fish Dept.<br/>Arizona Mills<br/>Arizona Refrigeration Service<br/>Arizona's Children Association<br/>Arizona State University<br/>Arizona Wide Electric, Inc.<br/>ASML<br/>Atlas Logistics<br/>At Your Service Companies<br/>ATMI<br/>Auto Zone<br/>Aventerra<br/>AZ Control Specialist AZCS<br/>B &amp; L HVAC Service Inc<br/>Balsz School District #31<br/>Banner Good Samaritan Medical Center<br/>Banner Thunderbird Medical Center<br/>Barcat, Inc.<br/>Beatitudes Campus<br/>Biltmore Properties<br/>Blood Systems<br/>Boys &amp; Girls Clubs of Scottsdale<br/>Boxer Properties<br/>Buckeye Unified School District<br/>Bunzl Extrusion<br/>Burt-Burnett Inc.<br/>Camp Verde Electric<br/>Camp Verde Schools<br/>Camroad Properties<br/>Carefree Resort &amp; Villas<br/>Cartwright School District<br/>Casino Arizona<br/>Central Arizona Project<br/>CCMC<br/>CGCC/Williams<br/>CGI<br/>Chandler-Gilbert Comm. College MCC<br/>Chem Research<br/>ChemTreat, Inc.<br/>Chinle High School<br/>Christian Care Manor I, Inc.<br/>Christiansen Electric<br/>CHW<br/>City Block<br/>City of Chandler<br/>City of Goodyear<br/>City of Mesa<br/>City of Peoria<br/>City of Phoenix<br/>City of Phoenix/ Public Works/ DFM<br/>City of Scottsdale<br/>City of Surprise<br/>City of Tempe<br/>Climatec</p> | <p>Clopay Bldg. Prod.<br/>Coconino Community College<br/>Coconino County Facilities Management<br/>Colliers International<br/>Comfortex<br/>Commercial Air, Inc.<br/>Conair Corporation<br/>Concrete Reinforcement<br/>Copper Canyon High School<br/>Copperwynd Resort<br/>Cornerstone Property Service<br/>Crescent Crown Distributing<br/>CRT Partners<br/>CTI<br/>Cushman &amp; Wakefield<br/>DaimlerChrysler APG<br/>D-Dock<br/>Del E. Webb Hospital<br/>Delta Diversified Enterprises<br/>Dept. Veterans Affairs<br/>DEMA<br/>Desert Botanical Gardens<br/>Desert Comfort<br/>Desert Troon Companies<br/>Development Services of America<br/>Dial Manufacturing<br/>Dignity Health<br/>Dillards<br/>Discount Tire<br/>Discover/ABM<br/>DLR Group<br/>Doxa<br/>Earthgrains/Sara Lee<br/>East Valley Tribune Dailey News Sun<br/>Ebay, Inc.<br/>EchoStar Communications<br/>Echostar Satellite Corporation<br/>ECI Of AZ<br/>Edson Electric<br/>Electro-Motive, Corp.<br/>Energy Office<br/>Esplandale Place<br/>Esurance<br/>FAA<br/>Fairmont Scottsdale Princess<br/>Farnsworth Management<br/>FC &amp; M<br/>First Choice Maintenance<br/>Florence Schools<br/>Four Seasons Resort<br/>Fort McDowell Electrical<br/>Fort McDowell Reservation<br/>Forum Properties<br/>Freddy Works<br/>Fredericks of Hollywood<br/>Frito Lay<br/>Fry's Food &amp; Drug<br/>Fuel Cell Energy<br/>FutureWay Mechanical Inc.<br/>Gateway Airport<br/>G&amp;P Electric<br/>Gila County<br/>Gila River Health Care Co<br/>Glendale Community College<br/>Glendale Elementary School District<br/>Globe Management<br/>Gompers Habilitation Center<br/>Goodrich<br/>Goodwill Inc.<br/>Gould Electronics<br/>Great Hearts Academy<br/>Green Energy Services<br/>Hamilton Sundstrand<br/>Hampton Inn &amp; Suites<br/>Harrah's Ak-Chin Casino<br/>Heinz<br/>Hensley &amp; Co.<br/>Hickman Family Farms<br/>Higley Unified School District<br/>Hilton Hotels-AZ Biltmore<br/>Hines<br/>Holsum Bakery<br/>Honeywell<br/>Honeywell DSES Glendale<br/>Hopi Tribe/ Facilities Management<br/>Horizon Community Learning Center<br/>Hydro Aluminum<br/>Investors Property Service<br/>IMC Magnetics Corporation<br/>Indian Health Service<br/>Ingclarian<br/>Investors Property Service</p> | <p>Ironco enterprises<br/>Iron Horse Environment<br/>ITC<br/>JEMB Realty<br/>J.O. Combs School District<br/>Johnson Controls, Inc.<br/>Jones Lang La Salle<br/>JSG Associates<br/>J.W. Marriot Desert Ridge<br/>K &amp; S Flip Chip Division<br/>Kaiser Aluminum<br/>Keller Equipment Co.<br/>Kinetic Systems<br/>Kitchell<br/>Knight &amp; Associates, LLC<br/>Kohler Rental Power<br/>Kuhl's Electric<br/>La Paz County Sheriff's Office<br/>LBA Realty<br/>Legacy Homes<br/>Life Care Center of Scottsdale<br/>Linc Services<br/>Little America Motel<br/>Littleton School #65<br/>Malabi Southwest LLC<br/>MAPFRE Insurance<br/>Maricopa Community Colleges<br/>Maricopa County<br/>Maricopa Maintenance Services, LLC<br/>Maryvale Hospital<br/>Mayo Clinic Hospital<br/>McKesson<br/>McKinstry<br/>Mclane Sunwest<br/>Medtronic<br/>Mesa Arizona Temple<br/>Mesa Public Schools<br/>Metro Commercial<br/>MIHS<br/>Millenium High School<br/>MMI Tank Inc<br/>Moodlaw Enterprises<br/>Nadaburg School District #81<br/>Nats Corp<br/>NAU Capital Assets and Services<br/>Neltec<br/>Newgaard Mechanical<br/>Nobex Property Mgmt.<br/>NorthMarq<br/>Notre Dame Preparatory<br/>One Neck IT Services<br/>One Source<br/>Opus West Management Co.<br/>Orange Tree Golf Resort<br/>Orme School<br/>Paradise Club<br/>Paradise Education Center<br/>Paradise Valley Private School Foundation<br/>Paradise Valey School District #69<br/>Penske Automotive Group<br/>Peoria Schools #11<br/>PepsiCo<br/>Peter Piper Pizza<br/>Phelps Dodge<br/>Phoenix Country Club<br/>Phoenix Country Day School<br/>Phoenix Elementary School District #1<br/>Phoenix Heat Treating<br/>Phoenix Indian Medical Center<br/>Phoenix Manufacturing, Inc.<br/>Phoenix/Mesa Gateway Airport<br/>Pinnacle West Capital Corporation<br/>PM Realty Group<br/>Pointe South Mountain Resort<br/>Polymicro Technologies<br/>Powers Steel<br/>Production Mold Inc.<br/>Queen Creek Unified School District #95<br/>Recreation Centers of SCW<br/>Red Rock Stamping<br/>Reidco Sales Inc.<br/>Residence Inn<br/>Scottsdale/Marriott International<br/>Rio Salado College<br/>River Recycling<br/>Robert F. Knight &amp; Associates<br/>Rockford Corp.<br/>Rogers Corp.<br/>Royal Oaks Retirement Community<br/>Safeway<br/>Sand's Chevrolet<br/>Scottsdale Cultural Council</p> | <p>Scottsdale Healthcare<br/>Scottsdale Hospital<br/>Scottsdale Insurance Co.<br/>Scottsdale Unified School District<br/>Scottsdale Village Square<br/>Sedona- Oak Creek School District<br/>Service Request AC<br/>SES, Inc.<br/>Shamrock Foods<br/>Shea Homes<br/>Shurgard Storage<br/>Shutterfly Inc<br/>Sigler<br/>Snyder's of Hanover<br/>SODEXHO<br/>Solomon Management<br/>Sonoran Air<br/>Sonora Quest Laboratories<br/>Source Refrigeration<br/>South West Gas Corporation<br/>SRP<br/>SRP MIC<br/>St. Joseph's Hospital<br/>St. Jude Medical Center<br/>St. Microelectronics<br/>STO Corp.<br/>State Farm Insurance<br/>State of Arizona - DEMA<br/>State of Comfort Heating &amp; Cooling<br/>Statesman Corp USA<br/>Steris Laboratories<br/>Sumika Electronic Materials Inc.<br/>Summit Electrical, Inc.<br/>Summit Health<br/>Sun City Grand<br/>Sungard<br/>Sun Health Corporation<br/>Sun Master Cooling &amp; Heating<br/>Sundt Construction<br/>Sunnyside Unified School District #12<br/>Sunrise Preschool<br/>System Aire<br/>Take Charge America<br/>Target Financial Services<br/>Taser International<br/>TD Industries<br/>Techni-Craft<br/>Tempe Electric<br/>Tempe Mechanical<br/>Tepcon Construction, Inc.<br/>Terraces<br/>Tessenderlo Kerley, Inc.<br/>The Beatitudes Campus of Care<br/>The Heritage Tradition<br/>The Salvation Army<br/>The Westin Phoenix Downtown<br/>Thunderbird Academy<br/>Tohono O'odham Nation<br/>Tolleson High School District<br/>Town of Gilbert<br/>Town of Paradise Valley<br/>Toyota Arizona Proving Grounds<br/>Trammell Crow Company<br/>Transwestern Commercial Services<br/>Tri-City Mechanical<br/>TriWest Healthcare<br/>Tuba City Regional Health Care Corp.<br/>US Airways<br/>US Forest Service<br/>U.S. Govt. Office of Navajo-Hopi<br/>Indian Relocation<br/>United Dairy Men of Arizona<br/>US Dept of Agriculture<br/>USAA<br/>USPS<br/>V.A. Medical Center<br/>Verizon Wireless<br/>Viasat<br/>Volkswagen of America<br/>Watson Laboratories<br/>Wells Fargo<br/>Western Digital Corporation<br/>Westin Kierland<br/>Westminster Village<br/>White Electronic<br/>Williams Mechanical Services<br/>WIN-SAM Inc.<br/>W. L. Gore &amp; Associates<br/>Yavapai Regional Medical Center<br/>Yuma County General Services<br/>Yuma Union High School Dist. #70</p> |
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# ELA Institute for Facility Management Education

## The ELA Institute

**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.

## 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.

## Course Coverage

### FME 101

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

**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

**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

**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

### FME 104

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

**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.

- 2014 National Electrical Codes

### FME 105

#### ELECTRICAL MAINTENANCE AND POWER SYSTEMS FOR THE COMMERCIAL/INDUSTRIAL FACILITY

**Course Description:** Maintaining and operating electrical systems in a facility.

**Course Content:** An overview of electrical power systems, electrical maintenance and their application to the facility.

- The original facility design and construction
- Maintaining the original design
- Common modifications to the original design
- New technologies
- Consequences of new technology on facility operations
- Recommended electrical maintenance practices
- Industrial and commercial power systems

### FME 106

#### ELECTRICAL SAFETY FOR THE COMMERCIAL/INDUSTRIAL FACILITY

**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



# Course Coverage continued

## FME 107

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

**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

**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

**Course Description:** The purpose of this course is to familiarize the attendees with Indoor Air Quality.

**Course Content:** This course will cover how to identify and understand air quality issues, and how this impacts the facility.

- Identify common conditions conducive to mold growth
- Understand the possible health effects of mold
- Be familiar with the visual characteristics
- Understand how to prevent mold
- Understand the dramatic effect of mold in the facility

## 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

**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 manufactures will not be covered, only the overall theory of how these systems operate.

## FME 114

### WATER TREATMENT FOR HVAC SYSTEMS

**Course Description:** An overview of water treatment requirements for cooling systems.

**Course Content:**

- An in-depth discussion of why water creates problems
- Types of water cooling systems
- Treatment approaches for controlling corrosion, scaling and fouling
- Chemical handling and feeding
- How to calculate the amount of treatment required.

*"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



# Building Operators' Certificate

Sponsored by:



**Program Registration**

Operated by:



**Tuition** (Space is limited register early)

**\$1275 ELA Mbr. / \$1325 Non-Mbr. (Tuition includes books & lunch)**

**Please call the Institute at 602-263-0115 for more information**

**Dates:**  **September 14 - November 2, 2016**

**Eight Wednesdays ~ 9:00 a.m. - 5:00 p.m.**

**Location: Electric League Training Center - 2702 N. 3rd Street Ste. 2020, Phoenix, Arizona 85004**

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

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

Company: \_\_\_\_\_ Prefer to be called: \_\_\_\_\_

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

Title: \_\_\_\_\_

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

\*\*E-mail: \_\_\_\_\_ State: AZ Zip: \_\_\_\_\_

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

Check enclosed #: \_\_\_\_\_ Total Fees Due: \$ \_\_\_\_\_

VISA  MASTERCARD (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: \_\_\_\_\_

**\*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.

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

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

**Please return application and fees to:**

**ELA Institute - 2702 N. 3rd Street Ste. 2020, Phoenix, Arizona 85004**

**Fax 602-274-0029 or 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 HVAC theory and examine commercial systems, residential style equipment, water source heat pumps, and chillers with special emphasis on troubleshooting techniques.

- Refrigeration Theory I
- Refrigeration Theory II
- Refrigeration Components
- Charging & Piping
- Air Flow Dynamics
- A/C Control Systems I
- A/C Control Systems II
- A/C Control Systems III
- Commercial Systems I
- Commercial Systems II
- Water Source Heat pumps
- Chiller Systems
- HVAC Systems Review
- HVAC System Troubleshooting I
- HVAC System Troubleshooting II
- Review & Final Quiz

#### 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)

**\$865 ELA Member/\$915 Non-Member • Contact the Institute for more information at 602-263-0115**

**Dates: August 9 - December 1, 2016 • Tuesdays & Thursdays • Time: 6:00 p.m. - 8:50 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

(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.

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**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.

### HVAC Courses

#### HPC 126

##### REFRIGERATION FUNDAMENTALS

Dates: August 10, 2016  
Fees: \$113 Mbr/\$144 Non-Mbr  
Time: 6:00 p.m. - 9:30 p.m.  
Instructor: Robert MacPherson  
4 Continuing Education Credits

**What You Can Expect:** This class covers all the fundamentals of refrigeration and is highly recommended to take prior to the popular Refrigeration Theory & System Diagnosis.

#### HPC 101

##### REFRIGERATION THEORY & SYSTEMS DIAGNOSIS

Dates: August 15 & 17, 2016  
Fees: \$113 Mbr/\$144 Non-Mbr  
Time: 6:00 p.m. - 9:30 p.m.  
Instructor: Rich Porter  
4 Continuing Education Credits

**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: August 23, 25 & 30, 2016  
Fees: \$139 Mbr/\$170 Non-Mbr  
Time: 6:00 p.m. - 9:30 p.m.  
Instructor: Joel Harris  
4 Continuing Education Credits

**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: September 6 & 8, 2016  
Fees: \$113 Mbr/\$144 Non-Mbr  
Time: 6:00 p.m. - 9:30 p.m.  
Instructor: Carl Bartoli  
4 Continuing Education Credits

**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: September 13 & 15, 2016  
Fees: \$113 Mbr/\$144 Non-Mbr  
Time: 6:00 p.m. - 9:30 p.m.  
Instructor: Carl Bartoli  
4 Continuing Education Credits

**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: September 19 & 21, 2016  
Fees: \$174 Mbr/\$204 Non-Mbr  
Times: 6:00 p.m. - 9:30 p.m.  
Instructor: Tim Williams  
4 Continuing Education Credits

**What You Can Expect:** This class is designed to make you more comfortable with the International Mechanical 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: September 26 & 28, 2016  
Fees: \$113 Mbr/\$144 Non-Mbr  
Time: 6:00 p.m. - 9:30 p.m.  
Instructor: Tim Williams  
4 Continuing Education Credits

**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 156

##### VARIABLE FREQUENCY DRIVES

Date: November 10, 2016  
Fee: \$103 Mbr/\$134 Non-Mbr  
Time: 6:00 p.m. - 9:00 p.m.  
Instructor: Chris Owens  
4 Continuing Education Credits

**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 149

##### HVAC TROUBLESHOOTING

Dates: November 21, 2016  
Fees: \$103 Mbr/\$134 Non-Mbr  
Times: 6:00 p.m. - 9:30 p.m.  
Instructor: TBD  
4 Continuing Education Credits  
Location: Electric League of Arizona Training Center • 2702 N. 3rd Street, Ste. 2020, Phoenix, AZ 85004

**What You Can Expect:** This course will discuss proper steps and procedures for effective troubleshooting. We will discuss troubleshooting tool usage, calibration and care. We will review troubleshooting charts for electrical and mechanical for heating and cooling.

**Who Should Attend:** New service technicians and all installation technicians.



# Fall 2016 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 126</b> Refrigeration Fundamentals . . . . .	\$144 . . . . .	\$113
<input type="checkbox"/> <b>Master Heat Pump Technician Cert. Fee</b> . . . . .	\$ 50 . . . . .	\$ 30
<input type="checkbox"/> <b>HPC 101</b> Refrigeration Theory & Systems Diagnosis . . . . .	\$144 . . . . .	\$113
<input type="checkbox"/> <b>HPC 102</b> Charging, Piping & Dehydration . . . . .	\$170 . . . . .	\$139
<input type="checkbox"/> <b>HPC 103</b> Electric Fundamentals for Heat Pumps . . . . .	\$144 . . . . .	\$113
<input type="checkbox"/> <b>HPC 104</b> Control Systems for Heat Pumps . . . . .	\$144 . . . . .	\$113
<input type="checkbox"/> <b>HPC 106</b> HVAC Code & Safety . . . . .	\$204 . . . . .	\$174
<input type="checkbox"/> <b>HPC 107</b> Airflow Dynamics . . . . .	\$144 . . . . .	\$113
<input type="checkbox"/> <b>HPC 156</b> Variable Frequency Drives . . . . .	\$134 . . . . .	\$103
<input type="checkbox"/> <b>HPC 149</b> HVAC Troubleshooting . . . . .	\$134 . . . . .	\$103

\*The Heat Pump Council provides heavy hors d'oeuvres & 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

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





# 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:** The Residential Wiring Series will start to build a foundation of fundamental electrical skills in residential applications. This series prepares the student for ICBO/IAEI certification exams on one and two family dwellings plus the code portion of the C-11 contractor's license exam. Upon successful completion of the series you will be awarded a Certificate of Completion and will be prepared to progress to the Commercial Wiring Series.

**Required Courses:**

- ELE 101 Beginning Algebra for Technology
- ELC 119 Concepts of Electricity & Electronics
- ELC 123 Residential Electrical Wiring & Codes
- ELC 162 Electrical Codes & Inspection I
- ELC 164 Grounding & Bonding

### COMMERCIAL WIRING CERTIFICATE

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

**Description:** The Commercial Wiring Series builds upon your knowledge of residential applications and provides you with greater depth in skills and commercial electrical applications. This series prepares the student for the ICBO/IAEI electrical general certification exams and the code portion of state contractor's L-11 license exam. Upon successful completion of the series you will be awarded a Certificate of Completion and will be prepared to advance to the Industrial Wiring Series.

**Required Courses:**

- ELC 120 Solid State Fundamentals
- ELC 163 Electrical Codes and Inspection II
- ELC 217 Electric Motor Controls
- ELC 125 Commercial Electrical Wiring & Codes

### INDUSTRIAL WIRING CERTIFICATE

**Prerequisites:** Completion of Commercial Wiring Series or permission of the instructor.

**Description:** The Industrial Electrical Wiring Series continues to develop your knowledge of advanced electrical skills, typical of industrial applications. This series prepares the student for the ICBO/IAEI plan review certification. Upon successful completion of this series you will be awarded a Certificate of Completion and will be prepared to advance to the Electrical Technology Series.

**Required Courses:**

- ELC 124 Industrial Wiring and Codes
- ELC 219 Programmable Logic Controllers
- ELC 210 AC/DC Machinery
- ELC 218 Variable Frequency Drives
- ELC 298 Special Projects

### CERTIFICATE OF COMPLETION IN ELECTRICAL TECHNOLOGY

**Prerequisites:** Completion of the Industrial Wiring Series.

**Description:** The Electrical Technology program is designed to prepare students for employment as electrical technicians, journeymen and master electricians. The experienced technician who demonstrates quality workmanship, willingness to learn, organizational and communication skills will find opportunities to move into other jobs within the industry such as management, sales, field service, business ownership or teaching.

**Required Courses:**

- ENG 101 Freshman English
- ENG 111 Technical Writing
- ELE 105 Algebra-Trigonometry for Technology

### ASSOCIATE OF APPLIED SCIENCE IN ELECTRICAL TECHNOLOGY

(Issued by GateWay Community College)

**Requirements:** 70 Credits Total  
2.0 GPA Overall

**Technical Program:** 45 Credits  
**General Studies:** 19-25

<b>Classes</b>	<b>Credits</b>
<b>Technical Program:</b>	

ELC 219 Programmable Logic 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 162 Electrical Codes & Inspection I. . . . .	3
ELC 163 Electrical Codes & Inspection 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
ELE 101 Beginning Algebra for Technology . . . . .	3
ELE 105 Algebra-Trigonometry for Technology . . . . .	3
ELC 298AA Special Projects . . . . .	1-3
ELC 298AB Special Project II (if needed) . . . . .	1-3
<b>General Studies:</b>	
ENG 101 First Year Composition . . . . .	3
ENG 111 Technical Writing. . . . .	3
COM 230 Small Group Communication . . . . .	3
CRE 111 Critical Reading for Business and Industry (Or equivalent assessment). . . . .	3
MAT 122 Intermediate Algebra Accelerated (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 and ELE classes earn three college credits and meet once a week at Gateway Community College, 108 N. 40th Street, Phoenix, AZ 85034. \*\*Fees for ELC and ELE classes are \$297 for ELA Members\* and \$333 for Non-Members.\* Plus a \$15 Gateway registration fee (per student). **Textbooks are additional** and may be purchased at the GateWay Community College Bookstore. (602-286-8400)

## 16-Week Classes

Once a week at Gateway College

### ELC 163

#### ELECTRICAL CODES AND INSPECTION II (NEC II)

Dates: Tues., Aug. 23 – Nov 29, 2016  
Time: 6:00 p.m. - 9:10 p.m.  
Instructor: Daniel Turley  
Fees: \$297 Mbr/\$333 Non-Mbr  
Reg Fee: \$15 per student

National Electrical Code (NEC) requirements for hazardous locations, special use and occupancies. Commercial, industrial and service locations. Fiber optics, communications and other state-of-the-art applications. Local inspection practices and requirements.

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

**Prerequisites:** ELC 162

### ELC 119

#### CONCEPTS OF ELECTRICITY & ELECTRONICS

Dates: Thurs., Aug. 25 - Dec. 8, 2016  
Time: 6:00 p.m. - 9:10 p.m.  
Instructor: Elmer Tepper  
Fees: \$297 Mbr/\$333 Non-Mbr  
Reg Fee: \$15 per student

Learn the principles of electric circuits, magnetism and electromagnetism including basic motors and generators. Understand the use of basic measuring instruments. This course also includes an overview of 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

## 16-Week Classes

\*Once a week at ELA Training Cntr.

### ELC 210

#### AC MACHINERY AND DC MACHINERY

Dates: Mon., Aug. 22 - Dec. 5, 2016  
Time: 6:00 p.m. - 9:10 p.m.  
Instructor: Steve Holmquist  
Fees: \$297 Mbr/\$333 Non-Mbr  
Reg Fee: \$15 per student

Principals and operation of AC and DC motors, generators, and alternators. Includes single-phase motors along with induction, synchronous, and wound-rotor types three-phase motors. DC motors including shunt field, series field, wound-rotor, permanent magnet, stepper and Brussels types.

**Who Should Attend:** Anyone needing a working knowledge of AC/DC motors, generators, and alternators. This includes electricians, contractors, engineers, facility maintenance, equipment sales and service, supervisors, managers and planners.

**Prerequisites:** ELC119

### ELC 164

#### GROUNDING & BONDING

Dates: Wed., Aug. 24 - Nov. 30, 2016  
Time: 6:00 p.m. - 9:10 p.m.  
Instructor: Steve Holmquist  
Fees: \$297 Mbr/\$333 Non-Mbr  
Reg Fee: \$15 per student

Grounding and Bonding terminology including National Electric Code (NEC) Articles 250. Interpreting code requirements for grounding and bonding. Code requirements for field installation also covered.

**Who Should Attend:** Electrical apprentices, journeymen, contractors, inspectors, facility management or anyone seeking to upgrade their knowledge of the code.

**Prerequisites:** None

## One-Day Seminars

\*Non-College Credit at ELA Training Cntr.

### ELA 70

#### ELECTRICAL SAFETY FOR COMMERCIAL/INDUSTRIAL FACILITIES

Date: Friday, November 4, 2016  
Time: 8:30 a.m. - 4:00 p.m.  
Instructor: Dan Turley  
Fees: \$255 Mbr/\$285 Non-Mbr

(Fees include Continental 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 2015.

\*ELA Training Center  
2702 N. 3rd St. Phoenix, AZ 85004

### ELA 13

#### NEC CODE UPDATE

Date: Friday, December 2, 2016  
Time: 8:30 a.m. - 4:30 p.m.  
Instructor: Daniel Turley  
Fees: \$255 Mbr/\$285 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 2014 National Electric Codebook and lunch.

(\$50 off for those w/Codebooks)

\*ELA Training Center  
2702 N. 3rd St. Phoenix, AZ 85004

# Please Remember Register Early

## to avoid disappointments

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



# Fall 2016 Electrical Course Registration

\*Please read all areas of the registration portion of this form carefully and complete all necessary lines.

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

Company: \_\_\_\_\_ \*\*Email \_\_\_\_\_

Position: \_\_\_\_\_ Student ID: \_\_\_\_\_

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

State: AZ Zip: \_\_\_\_\_ Daytime Phone: \_\_\_\_\_ \*\*Fax#: \_\_\_\_\_

Contact Person/Company Responsible for Payment: \_\_\_\_\_

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

Are you a member of the ELA?  yes  no                      Are you enrolled in our certificate program?  yes  no  
 \*New Proposition 300 Policy requires that ALL new students provide **Gateway** a copy of their AZ ID or DL for in-state tuition.

**\*Date present stay in Arizona began** \_\_\_ / \_\_\_ / \_\_\_ (If born in Arizona and resided here continuously since birth use birthdate.) Fees are subject to an out of state/out of county tuition assessment by GateWay if:

1. You have resided in Maricopa County for less than one year.
2. You are not a legal resident.

**You may still attend all classes**, but the fees are an additional flat rate starting at \$325 per credit hour.

\_\_\_\_\_ Please initial here indicating you have read and understood the GCC Out of State Tuition Policy.

Do you require reasonable accommodations: Explain \_\_\_\_\_

Please note textbooks are not included and may be purchased at the Gateway Community College Bookstore or Builder's Book Depot.

Course Title	Member Fees*	Non-Member Fees*	Gateway Registration Fees
<input type="checkbox"/> ELC 119 Concepts of Electricity & Electronics . . . . .	\$297 . . . . .	\$333 . . . . .	+\$15
<input type="checkbox"/> ELC 163 Electrical Codes & Inspection II (NEC II) . . . . .	\$297 . . . . .	\$333 . . . . .	+\$15
<input type="checkbox"/> ELC 164 Grounding & Bonding . . . . .	\$297 . . . . .	\$333 . . . . .	+\$15
<input type="checkbox"/> ELC 210 AC Machinery & DC Machinery. . . . .	\$297 . . . . .	\$333 . . . . .	+\$15
<input type="checkbox"/> ELA 13 NEC Code Update . . . . .	\$255 . . . . .	\$285 . . . . .	Non College Credit
<input type="checkbox"/> ELA 70 Electrical Safety for Commercial Facilities . . . . .	\$255 . . . . .	\$285 . . . . .	Non College Credit

**Note:**  
 One (1) \$15.00  
 GateWay fee per student  
**ELA course fees do not  
 include text books**

Certificate Programs	Member Fees*	Non-Member Fees*
<input type="checkbox"/> Residential Certificate Fee. . . . .	\$ 30 . . . . .	\$ 30
<input type="checkbox"/> Commercial Certificate Fee. . . . .	\$ 30 . . . . .	\$ 30
<input type="checkbox"/> Industrial Certificate Fee. . . . .	\$ 30 . . . . .	\$ 30
<input type="checkbox"/> Technical Certificate Fee. . . . .	\$ 30 . . . . .	\$ 30
Sub Total _____	Sub Total _____	Sub Total _____

**Full Fee is due at the time of registration. Also valid state ID must be presented when appropriate, or an out-of-state fee will be charged. Fee Total \$ \_\_\_\_\_**

Check Enclosed #: \_\_\_\_\_  M/C  Visa

(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: \_\_\_\_\_

CC Billing Address if Different: \_\_\_\_\_ 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 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 understood the cancellation policy.)  
 \*These areas must be read and completed for registration.

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

Please return completed application and fees to: Electric League of Arizona, 2702 N. 3rd Street, Suite 2020, Phoenix, AZ 85004.  
 Fax: 602-274-0029 • Phone: 602-263-0115





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

PRSR STD  
U.S. POSTAGE  
**PAID**  
PHOENIX, AZ  
PERMIT NO. 1273

# The ELA Institute's Faculty



**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.



**Joe Bujanda, Electrical Instructor** - Mr. Bujanda has over thirty years experience in facilities engineering and construction field and has an Electrical Engineering degree from the University of Texas-El Paso. Prior to leaving the Bull Information Systems in 2000, Mr. Bujanda specialized in printed circuit boards, clean rooms and computer data processing facilities.



**Derrick A. Denis, CIAQP, CAC, CIEC** - Mr. Denis has been providing professional environmental consulting and industrial hygiene services for over 15 years. Mr. Denis has been Vice President of Indoor Environmental Quality (IEQ) for Clark Seif Clark, Inc. (CSC) for 9 years. Mr. Denis has performed and/or managed over 7,000 IEQ investigations. He has acquired various industry-relevant certifications in addition to a B.S. in Environmental Science. Mr. Denis is an active participant in the IEQ industry: he sat on the Indoor Air Quality Association (IAQA) Board of Directors, acts as Director of IAQA Phoenix Chapter, and is a member of the American Indoor Air Quality Council (AmIAQC) National Advisory Board.



**Daniel Turley** - Mr. Turley has over 27 years experience in the commercial and residential electrical industry and currently works as a maintenance electrician. He has over 12 years of supervisory experience, including over 8 years as a Licensed Arizona electrical contractor, and has overseen large electrical installations. He is a certified Level 1 Thermographer. One of his current projects is to perform Arc Flash Studies on various buildings in the valley and to apply NFPA 70E to promote electrical safety in the work place. His expertise is in Commercial, Residential and Industrial electrical work but he has general knowledge and understanding of plumbing, HVAC, and maintenance procedures. He has long been interested in vocational education, completing a Master of Education degree in Educational Media and Computers. He has written several computer-based training programs. He also has a Bachelor of Science in Psychology from ASU.



**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.



**Chris (Butch) Owens** - Mr. Owens is currently a Partner and Service Manager for Mech-Line Services LLC and has worked in several capacities for the refrigeration industry for over 24 years. Mech-Line Services is ABB HVAC Drives Manufacturer's Representative in Arizona. Butch holds over 28 Variable Frequency Drives, Motors, Hardware and related Certifications with ABB pertaining to AC Drives and Induction Motors. He is also EPA 40 CFR and Section 609 EPA Certified for refrigerants high and low pressure and is most honored to be part of a development council for ABB HVAC Drives for future products. Butch has taught for the Arizona Heat pump Council since 2011 and is also an Adjunct Instructor for the Electric League of Arizona's Electrical Continuing Education Program done in partnership with GateWay Community College.



**Elmer Tepper, Electrical Instructor** - 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.