ELA Institute for Facility Management Education

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Companies participating in ELA Institute Programs:

- 107 ACS
- 2nd Avenue Design
- A.G.S.I.M.
- AAA Arizona
- ABC Electric
- ABM Engineering
- ACT Electric
- ADUC
- ADOT
- AHCCCS State of Arizona
- Absolute Comfort Heating & Cooling, Inc.
- Air National Guard
- Air Refrigeration
- Arizona Air Conditioning
- Ak-Chin Indian Community
- AKE, Inc.
- Alameda Electric LLC
- Albertsons, Inc.
- All Properties Services
- All Team
- America West Airlines, Inc.
- American Express, IPG
- American Italian Pasta
- Andrew's Refrigeration Inc.
- Anthem Community Council
- APS
- APSES
- Archie Hendricks Sr. Skilled Nursing Facility
- Arco Services Co, Inc.
- Arizona Cardinals
- Arizona's Children Association
- Arizona Comfort & Refrigeration, Inc.
- Arizona Contractors Specialists
- Arizona Department of Commerce
- Arizona Department of Corrections
- Arizona Department of Transportation
- Arizona Exposition & State Fair
- Arizona Game & Fish Dept.
- Arizona Mills
- Arizona Refrigeration Service
- Arizona's Children Association
- Arizona State University
- Arizona Wide Electric, Inc.
- ASML
- Atlas Logistics
- At Your Service Companies
- ATMB
- Auto Zone
- Aventerra
- AZ Control Specialist AZCS
- B & L HVAC Service Inc
- Balaz School District #31
- Banner Good Samaritan Medical Center
- Banner Thunderbird Medical Center
- Barcel, Inc.
- Beattitudes Campus
- Biltmore Properties
- Blood Systems
- Boys & Girls Clubs of Scottsdale
- Boxer Properties
- Buckeye Unified School District
- Burst Extrusion
- Burt-Burnett Inc.
- Camp Verde Electric
- Camp Verde Schools
- Caremead Properties
- Carefree Resort & Villas
- Carefree School District
- Casino Arizona
- Central Arizona Project
- CCIM
- CCG/Williams
- CCI
- Chandler-Gilbert Comm. College MCI
- Chem Research
- ChemTreat, Inc.
- Chiricahua High School
- Christian Care Manor I, Inc.
- Christiansen Electric
- CHW
- City Block
- City of Chandler
- City of Goodyear
- City of Mesa
- City of Peoria
- City of Phoenix
- City of Phoenix/ Public Works/ DFM
- City of Scottsdale
- City of Surprise
- City of Tempe
- Climatec
- Clopay Bldg. Prod.
- Coconino Community College
- Coconino County Facilities Management
- Colliers International
- Comfortex
- Commercial Air, Inc.
- Conair Corporation
- Concrete Reinforcement
- Copper Canyon High School
- Copperwynd Resort
- Cornerstone Property Service
- Crescent Crown Distributing
- CRT Partners
- CTI
- Cushman & Wakefield
- DamlerChrysler APG
- D-Drink
- Del E. Webb Hospital
- Delta Diversified Enterprises
- Dept. Veterans Affairs
- DEMA
- Desert Botanical Gardens
- Desert Comfort
- Desert Tool Companies
- Development Services of America
- Dial Manufacturing
- Dignity Health
- Dillards
- Discount Tire
- Discover/ABM
- DLR Group
- Doka
- Earthgrains/Rara Lee
- East Valley Tribune Dailey News Sun
- Ebay, Inc.
- Echostar Communications
- Echostar Satellite Corporation
- EGI OF AZ
- Edison Electric
- Electro-Motive, Corp.
- Energy Office
- Esplanade Place
- Esurance
- FAA
- Fairmont Scottsdale Princess
- Farnsworth Management
- FC & M
- First Choice Maintenance
- Florence Schools
- Four Seasons Resort
- Fort McDowell Electrical
- Fort McDowell Reservation
- Forum Properties
- Freddie Works
- Fredericks of Hollywood
- Frito Lay
- Fry's Food & Drug
- Fuel Cell Energy
- FutureWay Mechanical Inc.
- Gateway Airport
- GP Electric
- Gila County
- Gila River Health Care Co.
- Glendale Community College
- Glendale Elementary School District
- Globe Management
- Gompers Habitation Center
- Goodrich
- Goodwill Inc.
- Goodwill Electronics
- Great Hearts Academy
- Green Energy Services
- Hamilton Sundstrand
- Hampton Inn & Suites
- Harrah's Ak-Chin Casino
- Heinz
- Hensley & Co.
- Hickman Family Farms
- Higley Unified School District
- Hilton Hotels-AZ Biltmore
- Hines
- Holsum Bakery
- Honeywell
- Honeywell DSS Glendale
- Hopi Tribal/ Facilities Management
- Horizon Community Learning Center
- Hydro Aluminum
- Investors Property Service
- IM Magnetics Corporation
- Indian Health Service
- Ingolstown
- Investors Property Service
- Inronco enterprises
- Iron Horse Environment
- ITC
- JEMB Realty
- J.O. Combs School District
- Johnson Controls, Inc.
- Jones Lang La Salle
- JSG Associates
- J.W. Marriott Desert Ridge
- K & S Flip Chip Division
- Kaiser Aluminum
- Keller Equipment Co.
- Kinetic Systems
- Kitchall
- Knight & Associates, LLC
- Kohler Rental Power
- Kuhn's Electric
- La Paz County Sheriff's Office
- LBA Realty
- Legacy Homes
- Life Care Center of Scottsdale
- Linc Services
- Little America Motel
- Littleton School #65
- Malabati Southwest LLC
- MAPFRE Insurance
- Maricopa Community Colleges
- Maricopa County
- Maricopa Maintenance Services, LLC
- Maryvale Hospital
- Mayo Clinic Hospital
- McKesson
- McKendry
- Mclane Sunwest
- Medtronic
- Mesa Arizona Temple
- Mesa Public Schools
- Metro Commercial
- MHIS
- Millennium High School
- MMJ Tank Inc
- Moodlaw Enterprises
- Naddad School District #81
- Nats Corp
- NAU Capital Assets and Services
- Netlens
- Newgaard Mechanical
- Nebboso Property Mgmt.
- NorthMarq
- Notre Dame Prepatory
- One Neck IT Services
- One Source
- Opus West Management Co.
- Orange Tree Golf Resort
- Orme School
- Paradise Club
- Paradise Education Center
- Paradise Valley Private School Foundation
- Paradise Valley School District #69
- Penske Automotive Group
- Phoenix Schools #11
- PepsiCo
- Peter Piper Pizza
- Phelps Dodge
- Phoenix Country Club
- Phoenix Elementary School District #1
- Phoenix Heat Treating
- Phoenix Indian Medical Center
- Phoenix Manufacturing, Inc.
- Phoenix/Mesa Gateway Airport
- Pineapple West Capital Corporation
- PM Realty Group
- Points South Mountain Resort
- Polycom Technologies
- Powers Steel
- Production Mold Inc.
- Queen Creek Unified School District #95
- Recreation Centers of SCW
- Red Rock Stamping
- Reidco Sales Inc.
- Reinsurance
- Scottsdale/Marriott International
- Rio Salado College
- River Recycling
- Robert F. Knight & Associates
- Rockford Corp.
- Rogers Corp.
- Royal Oaks Retirement Community
- Safeway
- Sand's Chevrolet
- Scottsdale Cultural Council
- Scottsdale Healthcare
- Scottsdale Hospital
- Scottsdale Insurance Co.
- Scottsdale Unified School District
- Scottsdale Village Square
- Sedona-Oak Creek School District
- Service Request AC
- SES, Inc.
- Shotgun Foods
- Shama Homes
- Shurgard Storage
- Shurtleff Inc.
- Sigler
- Snoddy's of Hanover
- SODEXHO
- Solomon Management
- Sonoran Electric
- Sonora Quest Laboratories
- Source Refrigeration
- South West Gas Corporation
- SRP
- SPR
- St. Joseph's Hospital
- St. Jude Medical Center
- St. Microelectronics
- STO Corp.
- State Farm Insurance
- State of Arizona - DEMA
- State of Comfort Heating & Cooling
- Stateline Club Corp USA
- Steris Laboratories
- Sumika Electronic Materials Inc.
- Summitt Electronics, Inc.
- Summit Health
- Sun City Grand
- Sundard
- Sun Health Corporation
- Sun Master Cooling & Heating
- Sundt Construction
- Sunnyvale Unified School District #12
- Sun Run
- System Air
- Talkeetna Alaska
- Target Financial Services
- Taser International
- TD Industries
- Techni-Craft
- Tempe Electric
- Tempe Mechanical
- Tecpon Construction, Inc.
- Tentmakers
- Tesendorfer Kerley, Inc.
- The Beattitudes Campus of Care
- The Heritage Tradition
- The Salvation Army
- The Westin Phoenix Downtown
- Thunderbird Academy
- Tohono O'odham Nation
- Tolleson Unified School District
- Town of Gilbert
- Town of Paradise Valley
- Toyota Arizona Proving Grounds
- Trammell Crow Company
- Transwestern Commercial Services
- Tri-City Mechanical
- TriWest Healthcare
- Tubac City Regional Health Care Corp.
- US Airways
- US Forest Service
- U.S. Govt. Office of Navajo-Hopi Indian Relocation
- Uniti Dairy Men of Arizona
- US Dept of Agriculture
- USDA
- USPS
- V.A. Medical Center
- Vertson Wireless
- Viasat
- Volkswagen of America
- Watson Laboratories
- Wells Fargo
- Western Digital Corporation
- Westin Kierland
- Westminster Village
- Whiz Electronics
- Williams Mechanical Services
- Win-SAM Inc.
- W.L. Greer & Associates
- Yavapai Regional Medical Center
- Yuma County General Services
- Yuma Union High School Dist. #70
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.
- 2017 National Electrical Codes

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

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 Retrosfits
- Lighting maintenance
Course Coverage

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 115
DESIGN & OPERATION OF COMMERCIAL CHILLED WATER 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.

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 registered 494 students in this program. These students represent 257 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 159 students in this program, representing 115 companies state wide.

The ELA Institute for Facility Management Education is very proud of the over 200 years of combined experience in related industry our 25 faculty members bring to our education programs. Most of the Institute’s instructors are expert practitioners in their specific field and bring a wealth of up to date knowledge to each class.
Tuition (Space is limited register early)

$1,275 ELA Mbr. / $1,325 Non-Mbr. (Tuition includes books & lunch)

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

Dates: ☐ September 13 - November 1, 2017

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

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:
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.)

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)

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

Dates: August 15 - December 7, 2017 • Tuesdays & Thursdays • Time: 6:00 p.m. - 8:50 p.m. No class week of Nov. 20.
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.

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
# 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**
- **Date:** August 9, 2017
- **Fees:** $114 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 103
**Electrical Fundamentals for Heat Pumps**
- **Dates:** September 5 & 7, 2017
- **Fees:** $114 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 FSC 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 101
**Refrigeration Theory & Systems Diagnosis**
- **Dates:** August 14 & 16, 2017
- **Fees:** $120 Mbr/$150 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 104
**Control Systems for Heat Pumps**
- **Dates:** September 12 & 14, 2017
- **Fees:** $114 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 18 & 20, 2017
- **Fees:** $174 Mbr/$204 Non-Mbr
- **Time:** 6:00 p.m. - 9:30 p.m.
- **Instructor:** Travis Howard
- **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 25 & 27, 2017
- **Fees:** $114 Mbr/$144 Non-Mbr
- **Time:** 6:00 p.m. - 9:30 p.m.
- **Instructor:** Rich Porter
- **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 102
**Charging, Piping, & Dehydration**
- **Dates:** August 22, 24 & 29, 2017
- **Fees:** $140 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 149
**HVAC Troubleshooting**
- **Dates:** November 14, 2017
- **Fees:** $104 Mbr/$134 Non-Mbr
- **Times:** 6:00 p.m. - 9:30 p.m.
- **Instructor:** Travis Howard
- **4 Continuing Education Credits**

**Location:** Electric League of Arizona Training Center • 2702 N. 3rd Street, Ste. 7, 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.

### HPC 162
**HVAC Variable Capacity Systems**
- **Dates:** November 16, 2017
- **Fees:** $104 Mbr/$134 Non-Mbr
- **Times:** 6:00 p.m. - 9:30 p.m.
- **Instructor:** Travis Howard
- **4 Continuing Education Credits**

**Location:** Electric League of Arizona Training Center • 2702 N. 3rd Street, Ste. 7, 2020, Phoenix, AZ 85004

**What You Can Expect:** This course will discuss the different types of systems from 2 speed compressors to true variable speed compressor systems. We will go over controls, design differences, operation and servicing procedures.

**Who Should Attend:** Service Managers, service technicians and installation technicians.
### Fall 2017 HVAC Course Registration

<table>
<thead>
<tr>
<th>Student Name:</th>
<th>Date:</th>
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<tbody>
<tr>
<td>Company:</td>
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<tr>
<td>Daytime Phone:</td>
<td>Fax #:</td>
</tr>
<tr>
<td>Person/Company responsible for payment:</td>
<td>Contact:</td>
</tr>
<tr>
<td>Are you a member of the ELA?  Yes  No</td>
<td></td>
</tr>
</tbody>
</table>

***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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Non-Member Rate</th>
<th>Member Rate</th>
</tr>
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<tbody>
<tr>
<td>HPC 126</td>
<td>Refrigeration Fundamentals</td>
<td>$144</td>
<td>$114</td>
</tr>
<tr>
<td>Master Heat Pump Technician Cert. Fee</td>
<td>$50</td>
<td>$30</td>
<td></td>
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<tr>
<td>HPC 101</td>
<td>Refrigeration Theory &amp; Systems Diagnosis</td>
<td>$150</td>
<td>$120</td>
</tr>
<tr>
<td>HPC 102</td>
<td>Charging, Piping &amp; Dehydration</td>
<td>$170</td>
<td>$140</td>
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<tr>
<td>HPC 103</td>
<td>Electric Fundamentals for Heat Pumps</td>
<td>$144</td>
<td>$114</td>
</tr>
<tr>
<td>HPC 104</td>
<td>Control Systems for Heat Pumps</td>
<td>$144</td>
<td>$114</td>
</tr>
<tr>
<td>HPC 106</td>
<td>HVAC Code &amp; Safety</td>
<td>$204</td>
<td>$174</td>
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<tr>
<td>HPC 107</td>
<td>Airflow Dynamics</td>
<td>$144</td>
<td>$114</td>
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<tr>
<td>HPC 149</td>
<td>HVAC Troubleshooting</td>
<td>$134</td>
<td>$104</td>
</tr>
<tr>
<td>HPC 162</td>
<td>Variable Capacity Systems</td>
<td>$134</td>
<td>$104</td>
</tr>
</tbody>
</table>

*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**

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 Electrical Codes & Inspection I  
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 163 Electrical Codes and Inspection 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)

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.

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
ELC 114 Basic Automated Systems Using Programmable Controllers 3
ELC 117 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 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
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 3
MAT 122 Intermediate Algebra 3
HUM 101 General Humanities 3
CHM 130 Fundamentals of Chemistry 3
CHM 130D Fundamentals of Chemistry 3
SOC 101 Introduction to Sociology 3
## Electrical Courses

Unless noted, ELC classes earn three college credits and meet once a week at Gateway Community College, 108 N. 40th Street, Phoenix, AZ 85034. **Fees for ELC 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

**ELC 163**  
**ELECTRICAL CODES AND INSPECTION II (NEC II)**  
- **Dates:** Tues., Aug. 22 – Dec 5, 2017  
- **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. 24 - Dec. 7, 2017  
- **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

**ELC 103**  
**ELECTRICAL/MECHANICAL CALCULATIONS**  
- **Dates:** Mon., Aug. 21 - Dec. 4, 2017  
- **Time:** 6:00 p.m. - 9:10 p.m.  
- **Instructor:** Elmer Tepper  
- **Fees:** $297 Mbr/$333 Non-Mbr  
- **Reg Fee:** $15 per student  

Fundamental calculations in arithmetic, algebra, trigonometry, descriptive geometry, economics, and probability. Application of theories and formulas to solve design, installation, maintenance, and troubleshooting problems for industrial, commercial, and residential electrical and mechanical systems.  
**Who Should Attend:** Highly recommended for entry level, electrical workers, utility and distributor personnel or anyone who uses basic mathematics for technology in their field.  
**Prerequisites:** None

**ELC 144**  
**BASIC AUTOMATED SYSTEMS USING PROGRAMMABLE LOGIC CONTROLLERS**  
- **Dates:** Wed., Aug. 23 - Dec. 6, 2017  
- **Time:** 6:00 p.m. - 9:10 p.m.  
- **Instructor:** Steve Holmquist  
- **Fees:** $297 Mbr/$333 Non-Mbr  
- **Reg Fee:** $15 per student  

Principles of automated control systems. Principles and application of programmable controllers; Control functions, hardware, logic, programming, documentation, troubleshooting, start-up, maintenance and operation. Commercial and industrial control applications. Introduction to commercial programmable controllers.  
**Who Should Attend:** Contractors, engineers, draftsmen, distributors, building owners and managers, plant maintenance personnel.  
**Prerequisites:** None

### 16-Week Classes

**ELC 162**  
**ELECTRICAL CODES AND INSPECTION II (NEC II)**  
- **Dates:** Tues., Aug. 22 – Dec 5, 2017  
- **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.  
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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

**ELC 103**  
**ELECTRICAL/MECHANICAL CALCULATIONS**  
- **Dates:** Mon., Aug. 21 - Dec. 4, 2017  
- **Time:** 6:00 p.m. - 9:10 p.m.  
- **Instructor:** Elmer Tepper  
- **Fees:** $297 Mbr/$333 Non-Mbr  
- **Reg Fee:** $15 per student  

Fundamental calculations in arithmetic, algebra, trigonometry, descriptive geometry, economics, and probability. Application of theories and formulas to solve design, installation, maintenance, and troubleshooting problems for industrial, commercial, and residential electrical and mechanical systems.  
**Who Should Attend:** Highly recommended for entry level, electrical workers, utility and distributor personnel or anyone who uses basic mathematics for technology in their field.  
**Prerequisites:** None

**ELC 144**  
**BASIC AUTOMATED SYSTEMS USING PROGRAMMABLE LOGIC CONTROLLERS**  
- **Dates:** Wed., Aug. 23 - Dec. 6, 2017  
- **Time:** 6:00 p.m. - 9:10 p.m.  
- **Instructor:** Steve Holmquist  
- **Fees:** $297 Mbr/$333 Non-Mbr  
- **Reg Fee:** $15 per student  

Principles of automated control systems. Principles and application of programmable controllers; Control functions, hardware, logic, programming, documentation, troubleshooting, start-up, maintenance and operation. Commercial and industrial control applications. Introduction to commercial programmable controllers.  
**Who Should Attend:** Contractors, engineers, draftsmen, distributors, building owners and managers, plant maintenance personnel.  
**Prerequisites:** None

### One-Day Seminars

**ELA 70**  
**ELECTRICAL SAFETY FOR COMMERCIAL/INDUSTRIAL FACILITIES**  
- **Date:** Friday, October 27, 2017  
- **Time:** 8:30 a.m. - 4:00 p.m.  
- **Instructor:** Dan Turley  
- **Fees:** $255 Mbr/$285 Non-Mbr  

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 1, 2017  
- **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 2017 National Electric Codebook and lunch. ($50 off for those w/Codebooks) *ELA Training Center 2702 N. 3rd St. Phoenix, AZ 85004

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**Please Remember Register Early to avoid disappointments**

REGISTER ONLINE AT: EDU.ELAZ.ORG
Fall 2017 Electrical Course Registration

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

<table>
<thead>
<tr>
<th>Student Name: __________________________</th>
<th>Date: __________________________</th>
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<tbody>
<tr>
<td>Company: _______________________________</td>
<td>**Email ________________________</td>
</tr>
<tr>
<td>Position: _______________________________</td>
<td>Student ID: _____________________</td>
</tr>
<tr>
<td>Mailing Address: _________________________</td>
<td>City: ___________________________</td>
</tr>
<tr>
<td>State: AZ Zip: __________ Daytime Phone: __________________ **Fax#: __________________</td>
<td></td>
</tr>
<tr>
<td>Contact Person/Company Responsible for Payment: ______________________________________</td>
<td></td>
</tr>
</tbody>
</table>

**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 then 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.

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Member Fees*</th>
<th>Non-Member Fees*</th>
<th>Gateway Registration Fees</th>
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<tr>
<td>ELC 119 Concepts of Electricity &amp; Electronics</td>
<td>$297</td>
<td>$333</td>
<td>+$15</td>
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<tr>
<td>ELC 163 Electrical Codes &amp; Inspection II (NEC II)</td>
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<td>$333</td>
<td>+$15</td>
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<tr>
<td>ELC 103 Electrical/Mechanical Calculations</td>
<td>$297</td>
<td>$333</td>
<td>+$15</td>
</tr>
<tr>
<td>ELC 144 Basic Automated Systems using PLC's</td>
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<td>$333</td>
<td>+$15</td>
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<tr>
<td>ELA 13 NEC Code Update</td>
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<td>$285</td>
<td>Non College Credit</td>
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<td>ELA 70 Electrical Safety for Commercial Facilities</td>
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Certificate Programs

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<th>Member Fees*</th>
<th>Non-Member Fees*</th>
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</tr>
<tr>
<td>Commercial Certificate Fee</td>
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<tr>
<td>Industrial Certificate Fee</td>
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</tr>
<tr>
<td>Technical Certificate Fee</td>
<td>$30</td>
<td>$30</td>
</tr>
</tbody>
</table>

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

Please return completed application and fees to: Electric League of Arizona, 2702 N. 3rd Street, Suite 2020, Phoenix, AZ 85004.

Email: education@elaz.org • Fax: 602-274-0029 • Phone: 602-263-0115
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.

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.

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.

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.

Steve Holmquist - Mr. Holmquist worked for several Fortune 500 companies over the last 37 years. Steve is experienced in every phase of facilities management, construction, maintenance, production systems and system integration projects from planning to completion. Expert level knowledge and proficiency in critical building infrastructure design, construction, manufacturing and operations. Designed and managed construction of data centers, industrial and commercial buildings and the systems that reside within these facilities.

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.

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.

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.