ELA Institute for Facility Management Education

Spring 2017

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

ELA Institute for Facility Management Education

Contents

Companies participating in ELA Institute Programs:

107 ACS
2nd Avenue Design
A.G.S.I.M
AAA Arizona
ABC Electric
ABM Engineering
ACT Electric
ADJC
ADOT
AHCCCS State of Arizona
Absolute Comfort Cooling & Heating, Inc.
Air National Guard
Air Refrigeration
Air-zona Air Conditioning
Ak-Chin Indian Community
AKE, Inc.
Alameda Electric LLC
Albertsons, Inc.
All Properties Services
All Team
America West Airlines, Inc.
American Express, IPC
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 Control Specialists, Inc.
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
ATMI
Auto Zone
Aventerra
AZ Control Specialist AZCS
B & L HVAC Service Inc
Balsz School District #31
Banner Good Samaritan Medical Center
Banner Thunderbird Medical Center
Barcat, Inc.
Beatitudes Campus
Biltmore Properties
Blood Systems
Boys & Girls Clubs of Scottsdale
Boxer Properties
Buckeye Unified School District
Bunzl Extrusion
Burt-Burnett Inc.
Camp Verde Electric
Camp Verde Schools
Camroad Properties
Carefree Resort & Villas
Cartwright School District
Casino Arizona
Central Arizona Project
CCMC
CGCC/Williams
CGI
Chandler-Gilbert Comm. College MCC
Chem Research
ChemTreat, Inc.
Chinle High School
Christian Care Manor I, Inc.
Christiansen Electric
CHW
City Block
City of Chandler
City of Goodyear
City of Mesa
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City of Phoenix
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City of Scottsdale
City of Surprise
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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
DaimlerChrysler APG
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Del E. Webb Hospital
Delta Diversified Enterprises
Dept. Veterans Affairs
DEMA
Desert Botanical Gardens
Desert Comfort
Desert Troon Companies
Development Services of America
Dial Manufacturing
Dignity Health
Dillards
Discount Tire
Discover/ABM
DLR Group
Doxa
Earthgrains/Sara Lee
East Valley Tribune Dailey News Sun
Ebay, Inc.
EchoStar Communications
Echostar Satellite Corporation
ECI Of AZ
Edson Electric
Electro-Motive, Corp.
Energy Office
Esplandade 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
Freddy Works
Fredericks of Hollywood
Frito Lay
Fry's Food & Drug
Fuel Cell Energy
FutureWay Mechanical Inc.
Gateway Airport
G&P Electric
Gila County
Gila River Health Care Co.
Glendale Community College
Glendale Elementary School District
Globe Management
Gompers Habilitation Center
Goodrich
Goodwill Inc.
Gould 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 DSES Glendale
Hopi Tribe/ Facilities Management
Horizon Community Learning Center
Hydro Aluminum
Investors Property Service
IMC Magnetics Corporation
Indian Health Service
Ingclarion
Investors Property Service
Ironco enterprises
Iron Horse Environment
ITC
JEMB Realty
J.O. Combs School District
Johnson Controls, Inc.
Jones Lang La Salle
JSG Associates
J.W. Marriot Desert Ridge
K & S Flip Chip Division
Kaiser Aluminum
Keller Equipment Co.
Kinetic Systems
Kitchell
Knight & Associates, LLC
Kohler Rental Power
Kuhl'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
Malabi Southwest LLC
MAPFRE Insurance
Maricopa Community Colleges
Maricopa County
Maricopa Maintenance Services, LLC
Maryvale Hospital
Mayo Clinic Hospital
McKesson
McKinstry
Mclane Sunwest
Medtronic
Mesa Arizona Temple
Mesa Public Schools
Metro Commercial
MIHS
Millenium High School
MMI Tank Inc
Moodlaw Enterprises
Nadaburg School District #81
Nats Corp
NAU Capital Assets and Services
Neltec
Newgaard Mechanical
Nobeus 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 Valey School District #69
Penske Automotive Group
Peoria Schools #11
PepsiCo
Peter Piper Pizza
Phelps Dodge
Phoenix Country Club
Phoenix Country Day School
Phoenix Elementary School District #1
Phoenix Heat Treating
Phoenix Indian Medical Center
Phoenix Manufacturing, Inc.
Phoenix/Mesa Gateway Airport
Pinnacle West Capital Corporation
PM Realty Group
Pointe South Mountain Resort
Polymicro Technologies
Powers Steel
Production Mold Inc.
Queen Creek Unified School District #95
Recreation Centers of SCW
Red Rock Stamping
Reidco Sales Inc.
Residence Inn 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.
Shamrock Foods
Shea Homes
Shurgard Storage
Shutterfly Inc
Sigler
Snyder's of Hanover
SODEXHO
Solomon Management
Sonoran Air
Sonora Quest Laboratories
Source Refrigeration
South West Gas Corporation
SRP
SRP MIC
St. Joseph's Hospital
St. Jude Medical Center
St. Microelectronics
STO Corp.
State Farm Insurance
State of Arizona - DEMA
State of Comfort Heating & Cooling
Statesman Corp USA
Steris Laboratories
Sumika Electronic Materials Inc.
Summit Electrical, Inc.
Summit Health
Sun City Grand
Sungard
Sun Health Corporation
Sun Master Cooling & Heating
Sundt Construction
Sunnyside Unified School District #12
Sunrise Preschool
System Aire
Take Charge America
Target Financial Services
Taser International
TD Industries
Techni-Craft
Tempe Electric
Tempe Mechanical
Tepcon Construction, Inc.
Terraces
Tessenderlo Kerley, Inc.
The Beatitudes Campus of Care
The Heritage Tradition
The Salvation Army
The Westin Phoenix Downtown
Thunderbird Academy
Tohono O'odham Nation
Tolleson High School District
Town of Gilbert
Town of Paradise Valley
Toyota Arizona Proving Grounds
Trammell Crow Company
Transwestern Commercial Services
Tri-City Mechanical
TriWest Healthcare
Tuba City Regional Health Care Corp.
US Airways
US Forest Service
U.S. Govt. Office of Navajo-Hopi Indian Relocation
United Dairy Men of Arizona
US Dept of Agriculture
USAA
USPS
V.A. Medical Center
Verizon Wireless
Viasat
Volkswagen of America
Watson Laboratories
Wells Fargo
Western Digital Corporation
Westin Kierland
Westminster Village
White Electronic
Williams Mechanical Services
WIN-SAM Inc.
W. L. Gore & Associates
Yavapai Regional Medical Center
Yuma County General Services
Yuma Union High School Dist. #70

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; Arizona Energy Office 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 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
- Use of Arizona Energy Office free Excel macro program that allows easy manipulation of account history data into charts, graphs and other graphics
- 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: ❑ February 22 - April 12, 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

Sponsored by SRP® Operated by

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.)

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: January 17 - May 11, 2017 • Tuesdays & Thursdays • Time: 6:00 p.m. - 8:50 p.m. No classes week of March 13th.
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: January 18, 2017
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: January 23 & 25, 2017
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: February 2, 7 & 9, 2017
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: February 14 & 16, 2017
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: February 21 & 23, 2017
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: Feb. 27 & March 1, 2017
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: March 13 & 15, 2017
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 149

HVAC TROUBLESHOOTING

Date: April 6, 2017
Fee: $104 Mbr/$134 Non-Mbr
Time: 3:00 p.m. - 6:30 p.m.
Instructor: Travis Howard
4 Continuing Education Credits

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 147

COMMERCIAL REFRIGERATION

Dates: April 4, 2017
Fees: $103 Mbr/$134 Non-Mbr
Times: 6:00 p.m. - 9:30 p.m.
Instructor: Robert MacPherson
4 Continuing Education Credits

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

Spring 2017 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
❑ **HPC 126** Refrigeration Fundamentals	$144	$113
❑ **Master Heat Pump Technician Cert. Fee**	**$ 50**	**$ 30**
❑ **HPC 101** Refrigeration Theory & Systems Diagnosis	$144	$113
❑ **HPC 102** Charging, Piping & Dehydration	$170	$139
❑ **HPC 103** Electric Fundamentals for Heat Pumps	$144	$113
❑ **HPC 104** Control Systems for Heat Pumps	$144	$113
❑ **HPC 106** HVAC Code & Safety.	$204	$174
❑ **HPC 107** Airflow Dynamics	$144	$113
❑ **HPC 149** HVAC Troubleshooting.	$134	$104
❑ **HPC 147** Commercial Refrigeration.	$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

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 144 Basic Automated Systems Using Programmable 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

Classes		Credits
Technical Program:		
ELC 144	Basic Automated Systems Using Programmable Controllers	2
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
General Studies:		
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)

SPRING BREAK - MARCH 13 - 17

16-Week Classes
Once a week at Gateway College

ELC 123
RESIDENTIAL ELECTRICAL WIRING & CODES

Dates: Mon., Jan. 23 – May 15, 2017
No class: Feb. 20 & March 13
Time: 6:00 p.m. - 9:10 p.m.
Instructor: Daniel Turley
Fees: $297 Mbr/$333 Non-Mbr
Reg Fee: $15 per student

Discover more about electrical fundamentals, electrical connections, service installation, outlet and switch wiring, residential wiring methods, the use of conduit, appliance installation, and estimating.

Who Should Attend: This class will help journeymen, apprentices and contractors upgrade their residential skills.

Prerequisites: None

ELC 120
SOLID STATE FUNDAMENTALS

Dates: Wed., Jan. 25 - May. 10, 2017
Time: 6:00 p.m. - 9:10 p.m.
Instructor: Steve Holmquist
Fees: $297 Mbr/$333 Non-Mbr
Reg Fee: $15 per student

Theory of operation of semi-conductor devices, component and system construction, operation, installation, and service. Specific and practical application in relation to temperature, light, speed and pressure control. Includes amplifiers, power supplies, integrated circuits, fiber optics, and safety. Who Should Attend: Entry level electrical or electronic workers, utility and distributor personnel or anyone wanting to understand the basic of electronics.

Prerequisites: ELC119 or permission of the instructor.

16-Week Classes
***Once a week at ELA Training Cntr.**

ELC 218
VARIABLE FREQUENCY DRIVES

Dates: Tues., Jan. 24 - May. 9, 2017
Time: 6:00 p.m. - 9:10 p.m.
Instructor: Chris "Butch" Owens
Fees: $297 Mbr/$333 Non-Mbr
Reg Fee: $15 per student

Principles and operation of frequency controlled AC motor drives, including current source inverters (CSI), variable voltage inverters (VVI) and pulse width modulated inverters (PWM). Heating, ventilation and air conditioning (HVAC) applications along with energy savings, motor pump sizing and torque load calculations.

Who Should Attend: This class is designed for anyone interested in learning more about VFD's including electricians, engineers, facilities maintenance and planners.

Prerequisites: None

ELC 162
ELECTRICAL CODES & INSPECTION I (NEC I)

Dates: Thurs., Jan. 26 - May. 11, 2017
Time: 6:00 p.m. - 9:10 p.m.
Instructor: Elmer Tepper
Fees: $297 Mbr/$333 Non-Mbr
Reg Fee: $15 per student

National Electric Code is reviewed. Local inspection practices and requirements are also discussed.

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

Prerequisites: None

One-Day Seminars
***Non-College Credit at ELA Training Cntr.**

ELA 70
ELECTRICAL SAFETY FOR COMMERCIAL/INDUSTRIAL FACILITIES

Date: Friday, March 3, 2017
Time: 8:30 a.m. - 4:00 p.m.
Instructor: Daniel 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, April 21, 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

Please Remember Register Early

to avoid disappointments

REGISTER ONLINE AT:

EDU.ELAZ.ORG

Spring 2017 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 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.

Course Title	Member Fees*	Non-Member Fees*	Gateway Registration Fees
❑ ELC 123 Residential Electrical Wiring & Codes	$297	$333	+$15
❑ ELC 162 Electrical Codes & Inspection I (NEC I)	$297	$333	+$15
❑ ELC 120 Solid State Fundamentals	$297	$333	+$15
❑ ELC 218 Variable Frequency Drives	$297	$333	+$15
❑ ELA 13 NEC Code Update	$255	$285	Non College Credit
❑ 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*
❑ Residential Certificate Fee	$ 30	$ 30
❑ Commercial Certificate Fee	$ 30	$ 30
❑ Industrial Certificate Fee	$ 30	$ 30
❑ 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

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

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 - For over 21 years Mr. Derrick A. Denis has provided professional environmental consulting and industrial hygiene services. Since earning a B.S. degree in Environmental Science from Phillips University in Oklahoma, Mr. Denis has worked in both environmental consulting and remediation across the United States. Mr. Denis holds or has held numerous industry-relevant certifications. He has contracted, managed, and/or performed over 15,000 indoor environmental quality (IEQ) projects with values ranging from under $25.00 to over $250,000.00. For over sixteen years Mr. Denis has operated in the capacity of Vice President of Indoor Environmental Quality for Clark Seif Clark, Inc. (CSC). In 2002 Mr. Denis opened CSC's Southwestern office which is now located in Chandler, Arizona.

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.

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.