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## Industrial Maintenance Electrical Mechanic Certificate

- Classes are offered in four-hour blocks on Tuesday OR Thursday mornings, 8:00 am to noon, starting April 1, 2014.
  - Participants can complete all the certificate coursework in two years by successfully completing each class.
  - Math tutoring is available through Henderson Community College Adult Education.
  - Partial state funding for this certificate is available through the KY WINS program.
  - Enrollment is limited to 12 students each class group (Tues. / Thurs.) for a total of 24 participants.
  - Individual companies can enroll one or more students.
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### **SCHEDULE**

Employers will have the option of selecting one of the following two schedules:

Group A: Tuesday morning (8:00 am to noon) starting April 1, 2014, OR

Group B: Thursday morning (8:00 am to noon) starting April 3, 2014

Employers will contract for each class individually and classes will run sequentially until all courses are complete. The tentative schedule for each class is as follows:

#### ELT 110, Circuits I

Group A: April 1, 2014 thru October 7, 2014

(No class the weeks of Memorial Day, 4<sup>th</sup> of July, and Labor Day)

Group B: April 3, 2014 thru October 9, 2014

(No class the weeks of Memorial Day, 4<sup>th</sup> of July, and Labor Day)

#### ELT 244, Electrical Machinery and Control

Group A: October 14, 2014 thru March 10, 2015

(No class the weeks of Thanksgiving, Christmas, and New Year's Day)

Group B: October 16, 2014 thru March 12, 2015

(No class the weeks of Thanksgiving, Christmas, and New Year's Day)

#### ELT 250, Programmable Logic Controllers

Group A: March 17, 2015 thru August 4, 2015

(No class the weeks of Memorial Day and the 4<sup>th</sup> of July)

Group B: March 19, 2015 thru August 6, 2015

(No class the weeks of Memorial Day and the 4<sup>th</sup> of July)

#### FPX 100 and 101, Fluid Power and Fluid Power Lab

Group A: August 11, 2015 thru March 1, 2016

(No class the weeks of Labor Day, Thanksgiving, Christmas, and New Year's Day)

Group B: August 13, 2015 thru March 3, 2016

(No class the weeks of Labor Day, Thanksgiving, Christmas, and New Year's Day)

## **CLASSES**

The certificate will include the following 4 courses:

### **1. ELT 110      Circuits I      5 Credits**

#### **Description:**

Introduces application of basic DC and AC circuits, including circuit analysis techniques with discussion of introductory magnetism and transformer principles. Emphasizes design, construction, and troubleshooting of simple DC and AC circuits in laboratory exercises.

**Total Classroom Hours: 105**

#### **Competencies/Student Outcomes:**

Upon completion of this course, the student can:

- Apply and understand electrical safety principals and PPE use under OSHA regulations.
- Solve series and parallel DC circuits.
- Identification and use of hand tools and basic test equipment.
- Design, construct and troubleshoot simple DC voltage and current divider circuits.
- Demonstrate an understanding of resistance, capacitance, and inductance.
- Solve simple time-constant circuits, both R-C and R-L.
- Use Kirchhoff's Laws to analyze DC circuits.
- Demonstrate an understanding of basic magnetism and AC principles.
- Demonstrate an understanding of basic transformers.
- Demonstrate proficiency in the use of common electrical laboratory instrumentation.
- Exhibit verbal and written communication skills through teamwork and technical reports.
- Access pertinent electrical information in NEC Code Book.

### **2. ELT 244      Electrical Machinery and Controls      4 Credits**

#### **Description:**

Covers the study of theory and utilization of electrical motors and generators, including AC and DC motors and drives. Includes theory and utilization of limit switches, solenoids, relays, contactors, and solid state devices in control circuits. Provides application of digital and analog control techniques, ladder logic, and programming techniques to industrial and manufacturing processes. Prerequisite: ELT 110.

**Total Classroom Hours: 75**

#### **Competencies/Student Outcomes:**

Upon completion of this course, the student can:

- Identify various electrical motors and generators including AC and DC units, single and three phase.
- Describe various drive controllers of electrical motors.
- Identify various mechanical devices including limit switches, solenoids, relays, contactors and motor starters that are used in electrical control.
- Define the operation and application of mechanical devices including limit switches, solenoids, relays, contactors, and motor starters that are used in electrical control.
- Describe digital and analog control techniques including on-off control, on-off control with hysteresis, proportional control and PID control.
- Identify elements of a ladder logic diagram and define the programs control functions.

### **3. ELT 250 Programmable Logic Controllers 4 Credits**

#### **Description:**

Covers the study of Programmable Logic Controllers with an emphasis on the function and use of PLCs in an industrial environment. Prerequisite ELT 244.

**Total Classroom Hours: 75**

#### **Competencies/Student Outcomes:**

Upon completion of this course, the student can:

- Describe the history and function of PLC's and how to use them in an industrial setting.
- Design and troubleshoot PLC programs using ladder logic and a software utility or hand held terminal.
- Enter programs into the PLC so that they are useful in a control situation.
- Interface input and output devices with the PLC.

### **4. FPX 100 and 101 Fluid Power and Lab 5 Credits**

#### **Description:**

Includes fluid power theory, component identification and application, schematic reading, and basic calculations related to pneumatic and hydraulic systems and their operations. Provides practical experiences in the study of fluid power theory, hydraulics and pneumatics component identification, schematic reading, and basic calculations related to hydraulic and pneumatic systems and their operations.

**Total Classroom Hours: 105**

#### **Competencies/Student Outcomes:**

Upon completion of this course, the student can:

- Identify various hydraulic and pneumatic components based on their symbology.
- Describe various hydraulic and pneumatic components and how they work in a system.
- Identify various mechanical and electrical devices commonly incorporated in hydraulic and pneumatic circuitry and describe their function.
- Demonstrate the ability to identify the boot process and alternative boot methods and troubleshoot common problems.
- Define the operation and application of hydraulic and pneumatic motors and pumps/compressors.
- Ability to plumb hydraulic and/or pneumatic systems in laboratory experiments.
- Ability to demonstrate how electrical and/or pilot operated controls are used in a hydraulic and/or pneumatic system via laboratory experiments.

### **PRICING**

Henderson Community College cost per class is set at a fixed \$200 per classroom hour; however, if we get at least five participants, we can apply for a Multi-Company KY WINS Contract. Under that contract, the state will pay **65%** of the cost of the class.

With KY WINS funding, the cost per student per class would be as follows:

ELT 110, Circuits I (105 total contact hours)

If we have 12 participants: the price will be \$612.50 per participant  
If we have 10 participants: the price will be \$735.00 per participant  
If we have 5 participants: the price will be \$1470.00 per participant

Cost for Circuits I for all participants put together: \$7350

Course materials and textbooks would be added to this cost, but those also qualify for the KY WINS funding so the employers will only be responsible for 35% of the cost.

ELT 244, Electrical Machinery and Controls (75 total contact hours)

If we have 12 participants: the price will be \$437.50 per participant  
If we have 10 participants: the price will be \$526.00 per participant  
If we have 5 participants: the price will be \$1050.00 per participant

Cost for ELT 244 for all participants put together: \$5250

Course materials and textbooks would be added to this cost, but those also qualify for the KY WINS funding so the employers will only be responsible for 35% of the cost.

ELT 250, Programmable Logic Controllers (75 total contact hours)

If we have 12 participants: the price will be \$437.50 per participant  
If we have 10 participants: the price will be \$526.00 per participant  
If we have 5 participants: the price will be \$1050.00 per participant

Cost for ELT 250 for all participants put together: \$5253

Course materials and textbooks would be added to this cost, but those also qualify for the KY WINS funding so the employers will only be responsible for 35% of the cost.

FPX 100 and 101 Fluid Power and Lab (105 total contact hours)

If we have 12 participants: the price will be \$612.50 per participant  
If we have 10 participants: the price will be \$735.00 per participant  
If we have 5 participants: the price will be \$1470.00 per participant

Cost for FPX 100 and 110 for all participants put together: \$7350

Course materials and textbooks would be added to this cost, but those also qualify for the KY WINS funding so the employers will only be responsible for 35% of the cost.

For more information and registration contact either individual below:

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