Course Information
Division: Applied Science and Engineering Technology
Contact Hours: 60
Theory: 30
Lab Hours: 30
Total Credits: 3.0

Prerequisites: ELEC 125

Course Description
The course introduces the concepts and applications of the control and protection of industrial machines and systems through the use of programmable logic controllers (PLCs).

This course is a required core course for students pursuing an AAS in Electrical Engineering Technology

Program Outcomes Addressed by this Course:
Upon successful completion of this course, students should be able to:

B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.
D. Demonstrate Equipment/Instrumentation Competence
H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
I. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control
Course Outcome Summary

Required Program Core Course

ELEC 130
Introduction to
Programmable Logic Controllers

Course Outcomes
In order to evidence success in this course, the students will be able to:

1. Explain the advantages of Programmable Logic Controllers (PLCs) versus hard-wired automation.
   Applies To Program Outcome
   B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.
   D. Demonstrate Equipment/Instrumentation Competence
   H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
   I. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control

2. List the component parts of a PLC and describe the function of each.
   Applies To Program Outcome
   B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.
   D. Demonstrate Equipment/Instrumentation Competence
   H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
   I. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control

3. Configure a PLC system by defining I/O, Internal Memory, and Communication Parameters.
   Applies To Program Outcome
   B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.
   C. Develop and demonstrate effective wiring and laboratory skills.
   D. Demonstrate Equipment/Instrumentation Competence
   G. Value Safety Training, Safe Work Practices and acknowledge Safety Standards
   H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
   I. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control
4. Program a PLC using standard interface software.

   Applies To Program Outcome

   B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.
   D. Demonstrate Equipment/Instrumentation Competence
   H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
   I. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control

5. Apply I/O addresses in accordance with the PLC manufacturer's addressing scheme and in accordance with the physical wiring to the input rack and from the output rack.

   Applies To Program Outcome

   B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.
   D. Demonstrate Equipment/Instrumentation Competence
   H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
   I. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control

6. Debug a PLC program to verify correct function.

   Applies To Program Outcome

   B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.
   D. Demonstrate Equipment/Instrumentation Competence
   H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
   I. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control
Course Outcome Summary
Required Program Core Course

ELEC 130
Introduction to Programmable Logic Controllers

7. Apply relay type PLC instructions properly (Examine-On, Examine-Off, and Output Energize) in a program.
   
   Applies To Program Outcome

   B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.
   D. Demonstrate Equipment/Instrumentation Competence
   H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
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8. Apply timer and counter instructions in a program.
   
   Applies To Program Outcome

   B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.
   D. Demonstrate Equipment/Instrumentation Competence
   H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
   I. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control

9. Perform calculations in hex, binary and octal number systems and program PLC's to do similar math operations.
   
   Applies To Program Outcome

   B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.
   D. Demonstrate Equipment/Instrumentation Competence
   H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)
   I. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control
ELEC 130
Introduction to
Programmable Logic Controllers

Course Outcome Summary

Required Program Core Course

10. Write PLC logic to manipulate string data.

 Applies To Program Outcome

B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.

D. Demonstrate Equipment/Instrumentation Competence

H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)

I. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control

11. Program touchscreens or other Human Machine Interfaces (HMI's) to interface with PLC logic.

 Applies To Program Outcome

B. Utilize Virtual Instrumentation, Data Acquisition, Schematic Capture and Test and Applications software packages to refine skills and to analyze and design various electronic circuits.

D. Demonstrate Equipment/Instrumentation Competence

H. Develop and demonstrate the synergistic relationship and integration of various technical and academic fields into the study of Electronics (i.e. Mechatronics)

I. Design, Construct, and Troubleshoot AC and DC Motor Control Circuits and demonstrate an understanding of process control

Date Updated: October 10, 2019
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