

FLORIDA STATE COLLEGE AT JACKSONVILLE

NON-COLLEGE CREDIT COURSE OUTLINE

COURSE NUMBER: EEV 0332

COURSE TITLE: Introduction to PLCs

PREREQUISITE(S): None

COREQUISITE(S): None

TOTAL CONTACT HOURS: 60

(For Office Use Only:
Vocational Credits 2)

FACULTY WORKLOAD POINTS: 2

STANDARDIZED CLASS SIZE
ALLOCATION: 24

COURSE DESCRIPTION:

This course is designed to prepare a student in the area of programmable logic controls (PLCs) by providing them the skills to comprehend the basic theory and operations as required in an industrial environment.

SUGGESTED TEXT(S): None

IMPLEMENTATION DATE: Winter Term, 1994 (942)

LAST REVIEW/MODIFICATION DATE: Summer Term, 2000 (20003)
Fall Term, 2002 (20031)
Fall Term 2006 (20071)

COURSE TOPICS	<u>CONTACT HOURS PER TOPIC</u>
I. Programmable Controls	20
A. Background	
1. 1968 General Motors Corp.	
2. Elimination of Relay Type Control	
B. Definitions	
1. Conceptual Design	
2. Conceptual Applications	
C. Principles of Operation	
1. System Components	
2. System Language Used	
D. PLCs Versus Relay Control	
1. Needs of User	
2. Costs	
3. Requirements for Control Changes	
E. Typical Areas of PLC Applications	
1. Manufacturing	
2. Chemical Processes	
3. Mining	
4. Paper/Pulp/Lumber Processes	
5. Power Generation	
6. Other	
F. Ranges of Product Application	
1. Small	
2. Medium	
3. Large	
G. PLC Diagrams/Language	
1. Ladder	
2. Function Block	
3. Boolean	
II. Operation of PLC's	20
A. Number Systems and Codes	
1. Conversion	
2. Systems	
3. Ones and Twos	
4. Binary Codes	
5. Register Format	
B. Logic Concepts	
1. Binary	
2. Logic Functions	
3. Boolean Algebra and Logic	
4. PLC Circuits and Logic Symbology	

COURSE TOPICS (continued)	<u>CONTACT HOURS</u> <u>PER TOPIC</u>
C. Processors (CPU), Power Supplies and Programmers	
1. Processors and Processor Scan	
2. Subsystem, Diagnostics, and Error Check	
3. Types of Power Supplies	
4. Programming Devices	
a. PC's	
b. Mini Programmers	
c. Lap-top Computers	
D. Memory Systems and I/O Interaction	
1. Overview	
2. Types	
3. Structure and Capacity	
4. Organization	
5. I/O Addressing	
6. Considerations	
E. Discrete I/O Systems	
1. Inputs	
2. Outputs	
3. Systems	
4. By-pass Control	
5. Summary	
F. Analog I/O Systems	
1. Inputs	
2. Outputs	
3. Systems	
4. By-pass Control	
5. Summary	
G. Special Function I/O	
1. Interfaces	
2. Temperature and PID Interfaces	
3. Positioning	
4. Data Handling and Communications	
5. Peripheral Interfacing	
III. Laboratory Exercises	

PROGRAM TITLE: Industrial Automation
 COURSE TITLE: Introduction to PLCs
 CIP NUMBER: 0615.040400

LIST PERFORMANCE STANDARD ADDRESSED:

NUMBER(S): TITLES(S):

16.0 IDENTIFY THE BASIC PRINCIPLES AND TERMINOLOGY OF PROCESS CONTROL--The student will be able to:

- 16.01 Identify the purpose of automatic control systems.
- 16.02 Identify the elements of process control.
- 16.03 Identify measured and manipulated variables in a control loop.
- 16.04 Demonstrate knowledge of proportional control.
- 16.05 Demonstrate knowledge of on/off control.
- 16.06 Determine the effects of gain, reset and derivative in a proportional control scheme.
- 16.07 Demonstrate knowledge of the basic laws of physics pertaining to instrumentation.

17.0 IDENTIFY THE PRIMARY COMPONENTS OF A PROCESS CONTROL SYSTEM--The student will be able to:

- 17.01 Identify primary control elements in process loops.
- 17.02 Identify final control elements in process loops.
- 17.03 Identify electronic, pneumatic, and digital transmitters in process loops.
- 17.04 Identify controllers in process loops.
- 17.05 Identify control loop applications (level, flow, temp, pressure, or analytical).
- 17.06 Define the static and dynamic characteristics of instruments.
- 17.07 Demonstrate knowledge necessary to interface individual process loops into microprocessor based control schemes.

21.0 DEMONSTRATE KNOWLEDGE OF PROGRAMMABLE LOGIC CONTROLLERS--The student will be able to:

- 21.01 Demonstrate knowledge of the terminology and operating components of PLC systems.
- 21.02 Demonstrate knowledge of the addressing schemes used in various PLC systems.
- 21.03 Understand and use ladder logic for various PLC systems.
- 21.04 Program basic relay logic in ladder logic.
- 21.05 Program timers and counters in ladder logic.
- 21.06 Program shift registers and other data manipulation routines.
- 21.07 Program for message displays and other output devices.
- 21.08 Interface PLS'c to perform communications.
- 21.09 Load and save files on storage media.
- 21.10 Prepare and update documentation.
- 21.11 Perform local/remote interfacing.
- 21.12 Troubleshoot defective PLC systems.

LIST PERFORMANCE STANDARD ADDRESSED: (continued)

NUMBER(S): TITLES(S):

29.0 DEMONSTRATE PROCESS OPERATION SKILLS--The student will be able to:

- 29.01 Use PLC's to troubleshoot process systems.
- 29.02 Identify safety isolation procedures for removing a device from a process.
- 29.03 Perform operating system checks, preventive maintenance and make minor adjustments to level control loops.
- 29.04 Perform operating system checks, preventive maintenance and make minor adjustments to vacuum/pressure control loops.
- 29.05 Perform operating system checks, preventive maintenance and make minor adjustments to temperature control loops.
- 29.06 Perform operating system checks, preventive maintenance and make minor adjustments to flow measuring instruments.
- 29.07 Perform operating system checks, preventive maintenance and make minor adjustments to consistency measuring instruments.
- 29.08 Perform operating system checks, preventive maintenance and make minor adjustments to liquid conductivity measuring instruments.
- 29.09 Perform operating system checks to pneumatic and hydraulic systems.
- 29.10 Operate control points on a DCS system.