PLC 1 Topic List

Data obtained from local employers show that their organizations have combination of legacy controllers (PLCs - Programmable Logic Controllers) and modern controllers (PACs - Programmable Automation Controllers), thus this course will be reflective of a local industry teaching both legacy controllers (AB MicroLogix, AB SLC-500 & PLC-5) and modern controllers (AB CompactLogix). More advanced PLC courses will be based on CompactLogix and ControlLogix platforms (including safety versions of the same platforms). As these legacy controllers are replaced with more modern controllers within the local industries, the curriculum at Terra State will evolve to align to the needs of the local employers.

***EET2440-PLC 1 Topics*:**

Module 1: Basic PLC Operation and Communications: Topics and Activities:

1. Basic operation of a PLC system
2. Explain a bit, byte, and a word in a PLC system
3. Identify the different PLCs used in the course (ML, SLC-500, PLC-5, CompactLogix)
4. Explain the addressing of each PLC used in this course.
5. Identify the processor, power supply, discrete input and output modules, and analog I/O module on each PLC used in the course
6. Identify and explain the different communication ports on the different PLCs, and connecting cables
7. Identify what driver you need to communicate to the various ports in RSLinx.
8. Identify the RS-232 and Ethernet ports on the computer, and Ethernet connectivity to the switch
9. Interpret the diagnostic indicators on each processor and I/O modules used in this course
10. Set up an RSLinx RS-232 driver to communicate from computer to ML and SLC-500
11. Create an Ethernet driver in RSLinx to connect to the ControlLogix Gateway
12. Explain the purpose and configuration of the ControlLogix Gateway.

Module 2: AB SLC-500 and RSLogix500 Basics: Topics and Activities:

1. Create a new project in RSLogix500, and download to the processor
2. Go online to the processor and change the mode of the processor (run or program)
3. Explain the operation of the basic relay instructions
4. Identify how to look up the plc instructions in the help files.
5. Interpret and explain the I/O addressing of the MicroLogix and SLC-500 systems
6. Toggle the instruction descriptions and symbols on/off in RSLogix500
7. Create a profile on Rockwell Automation for access to the knowledge base
8. Setup the Emulator in the Virtual Machine and run the same program as done with hardware in the PLC lab
9. Download a manual for an I/O module and explain how to wire it.
10. Use RSLogix500 to do basic program functions (Download, go online, go offline, upload)

Module 3: AB SLC-500 Timer, Counter & Compare? Instructions: Topics and Activities:

1. Interpret the operation of the AB timer instructions, and their status bits-***Lab 3.1 & 3.2***
2. Interpret the operation of the AB counter instruction, and their status bits-***Lab 3.3***
3. Create PLC programs with timer & counter instructions and load into the PLC processor ***-Lab 3.4***
4. Print a project ladder file to a pdf file for viewing***-Lab 3.4***
5. Explain use of subroutines and how to create them***-Lab 3.5 - fka Lab 11-MCR, JMP, LBL, JSR***
6. Create multiple subroutines to logically control a process***-Lab 3.5 - fka Lab 11-***↑
7. Navigate through the RSLogix500 project (ID Application Components and Navigation) with search cross reference commands***- fka Lab 11-***↑
8. Explain to the instructor how a PLC program operates that contains timers, counters and relay instructions

Module 4: AB PLC-5 and RSLogix5 Basics : Topics and Activities:

Indirect/Index Addressing? - *FKA Lab 12*

(This module satisfies the Ohio CTag requirement for University Transfer of this course)

1. Hardware basics on the AB PLC-5 system
2. I/O addressing in a PLC-5 system ***(L1 1&2 Slot Addressing-CTag)***
3. Purpose of DIP switches on the chassis and processor
4. Processor diagnostic indicators
5. Using RSLogix5 programming software with RSLinx to go Online with a PLC-5
6. Create a project in RSLogix5, with a Sequencer Output instruction to control the outputs on an PLC-5 hardware simulator ***(L2 Timer & LED Display-CTag), (L3 MUX BTR/BTW-CTag)***
7. Configure the Mask word in the Sequencer Output instruction ***(L4 Sequencer File-CTag)***
8. Load the file Integer file with data for the status of the output in the sequence
9. Create a PDF report of the ladder program and the cross reference report.
10. Explain the purpose of a block transfer instruction on a PLC-5 system

Module 5: AB CompactLogix, ControlLogix and Studio5000 Basics: Topics and Activities:

1. Hardware basics on the AB CompactLogix
2. Power supply requirements and placement ***(is this relevant to CompactLogix AND ControlLogix?)***
3. Processor diagnostic indicators
4. Identify and explain all communication ports on the CompactLogix processor
5. I/O tags (addressing) on the CompactLogix
6. Create a new project in Studio5000, by configuring the I/O, and creating alias and base tags in the Controller Tags settings.
7. Explain the difference between controller tags and program tags
8. Create a 4 rung program in a new project with the relay and timer instructions, using Studio5000
9. Use Studio5000 to do basic program functions (Download, go online, go offline, upload)

Module 6: AB CompactLogix: Data Types, Timer & Counter Instructions: Topics and Activities:

1. Explain the difference between timer and counter data types, as well as Integer, Signed Integer and Double Integer, Real, and Sint's
2. Interpret the operation of the AB timer instruction, and their status bits on a CompactLogix system

3. Interpret the operation of the AB counter instruction, and their status bits on a CompactLogix system
4. Create PLC programs with timer & counter instructions and load into the PLC processor
5. Navigate through the Studio5000 project (ID Application Components and Navigation) with search cross reference commands
6. Explain to the instructor how a PLC program operates that contains timers, counters and relay instructions
7. Print a project ladder file to a pdf file for viewing.

Module 7: Allen Bradley Compare and Move Instructions: Topics and Activities:

1. Interpret the operation of the AB basic compare instructions (LES, GRT, EQU, LEQ, GEQ, NEQ)
2. Interpret the operation of the AB limit test instruction (LIM), including circular & non-circular
3. Interpret the operation of the AB MOV and MVM instruction, with students setting up masking data
4. Interpret the hardware electrical prints of an MicroLogix 1000 system
4a. Interpret the hardware electrical prints of an AB SLC-500 based system
4b. Interpret the hardware electrical prints of an AB PLC-5 based system
4c. Interpret the hardware electrical prints of an AB ControlLogixs based system
4c. Interpret the hardware electrical prints of an AB CompactLogix based system
5. Predict the operation of a program that includes compare, Limit, and move instructions

Module 8: PLC Troubleshooting & Maintenance: Topics and Activities:

1. Recover from a hardware fault on a legacy or modern type of controller
2. Find and interpret the error causing the fault
3. Manipulate I/O with force commands (On, Off, Remove), as well as interpreting the Force indicator light
4. Modify a ladder program while online to a legacy or modern controller (online programming)
5. Modify a ladder program while online to a Control/Compact Logic processor
6. Utilize search commands to find instructions throughout a large PLC program
7. Troubleshoot a PLC system with an injected fault, using the software and hardware print
8. Replace a faulty I/O module on a PLC system
9. Replace a faulty processor on a PLC based system
10. Finding an output light on a PLC system based on addressing and electrical print