SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: EET-235 Class/Lect. Hours: 2 Lab Hours: 3 Credits: 3 Dept.: ELEC.AS/EROB.COC

Course Title: PLCs 2 Semester: Fall Year: 2016

Course Description, Prerequisite, Corequisite:

This course is the second course in the PLC sequence. Students will take the basic PLC skills they learned in EET-135 and apply them to advance applications which will include process control systems, HMI, analog and digital I/O and proportional-integral-differential controller concepts. In addition students will learn about modern PLC network topologies and protocols and communication protocols such as DeviceNet and Ethernet/IP.

Prerequisite: EET-111, EET-130, EET-135
Corequisite: EET-235L

Course Objectives	Competencies
1. Understand Basic PLC Programming.	a. Know XIO and XIC instructions. b. Understand standard logical programming sequences. c. Understand the basic scan cycle of a PLC d. Understand non-latching and latching outputs. e. Understand PLC Timer programming. f. Understand PLC Counter programming.
2. Understand Program Control Instructions.	a. Understand Master Control Reset instruction. b. Understand Jump & Subroutine instructions. c. Understand Immediate Input and Immediate Output Instructions. d. Understand Safety Circuitry associated with PLCs.
3.Understand Data Manipulation Instructions.	a. Understand various ways to move data within PLC memory.

Course Objectives	Competencies
	b. Understand the concept of Masking. c. Understand difference between MOVE and MOVE with MASK.
4. Understand Math Instructions.	a. Know how to use ADD, SUB, MUL and DIV instructions. b. Know how to use SQR, NEG, CLR, TOD, FRD and SCL instructions. c. Be able to perform Arithmetic Operations on File data.
5. Understand Sequencers.	a. Understand the SQO, SQI, SQC and SQL Sequencer instructions. b. Understand BSR, BSL shift register instructions.
6. Understand PLC Installation challenges.	a. Know how to deal with electrical noise (EMI & RF). b. Understand leaky inputs and outputs. c. Know grounding concerns. d. Voltage variations, spikes, surges and sags. e. Know basic PLC troubleshooting diagnostics.
7. Understand Process Control.	a. Understand both analog and digital sensors. b. Understand application and calibration of 4-20 mA sensors. c. Understand benefits of HMI d. Be able to use HMI to simplify PLC interfacing. e. Understand need for signal conditioning f. Understand OPEN LOOP and CLOSED LOOP control. g. Understand simple ON/OFF control. h. Understand purpose of hysteresis or deadband. i. Understand basic operation of a closed loop control system. j. Understand terms: set-point, process variable, error amplifier, controller and output actuator. k. Understand the basic operation of proportional, proportional-integral (PI), proportional-differential (PD) and proportional-integral-differential (PID) controllers.
8. Network Systems & SCADA	a. Understand basic networking concepts. b. Understand basic network topologies. c. Understand differences between serial and parallel communication.

Course Objectives	Competencies
	d. Understand industrial communication protocols such as ControlNet, DeviceNet, Ethernet/IP and others. e. Understand how to use a SCADA system for data acquisition.