

**MIAMI UNIVERSITY  
SCHOOL OF ENGINEERING AND APPLIED SCIENCE  
DEPARTMENT OF ENGINEERING TECHNOLOGY**

<b>ENT – 296</b>	<b>Programmable Logic Controllers</b>	<b>3</b>
Course Number	Title	Credit hours

**DESCRIPTION:**

Study of the principles and application of Programmable Logic Controllers including ladder logic, program control, data manipulation, math instructions, sequencers, shift registers, networking, PLC-mechanism interfacing and human-machine interfacing.

**PREREQUISITES:** ENT 192 Circuit Analysis I

**TEXT MATERIAL:**

Petruzella, Frank D., Programmable Logic Controllers, McGraw Hill, Third Edition, 2005  
Petruzella, Frank D., Lab Manual for Programmable Logic Controllers, McGraw Hill, 3e, 2005

**COURSE OBJECTIVE:** The student will develop an understanding of the operation and application of Programmable Logic Controllers. Specifically students will be able to do:

- Write PLC programs to solve complex control situations
- Connect a PLC to the web and monitor and control a process over the web
- Demonstrate competency in HMI programming

**OUTCOMES:** This course addresses the following outcomes planned for ECET program.

- Knowledge of electrical/computer engineering safety
- The ability to setup and analyze industrial local area networks
- The ability to conduct experiments, obtain data and make improvements in designs
- The ability to transfer data from a PLC using HMI Programming
- Effective teamwork skills
- A commitment to quality, timeliness, and continuous improvement
- Ability to produce written documents
- Ability to prepare and deliver oral presentations

**MEETING PLACE AND TIME:**

Wednesday, 6:00 – 9:40 p.m., Lecture 308 Phelps, Lab 303 Phelps

**INSTRUCTOR:**

**Roger Seifried** Office: 207H Phelps e-mail: [seifirc@muohio.edu](mailto:seifirc@muohio.edu),  
Phone: 785-1815 Office, 677-0962 Home office

Office Hours: Tuesday 1:00-2:30 p.m. Hamilton  
Wednesday 2:30-6:00 p.m. Hamilton  
Thursday 1:00-2:30 p.m. Hamilton  
Thursday 4:30-6:00 p.m. Middletown

**METHOD OF EVALUATION:**

The students will be evaluated on classroom and laboratory participation, homework, and tests. The student must meet minimum standards for laboratory work and assignments for satisfactory completion of the course. Grade will be determined as follows.

Tests	30%
Homework	10%
Labs	20%
Project Report	10%
Project Presentation	10%
Final Exam	20%

Course grade: 90-100% = A, 80-89% = B, 70-79% = C, 60-69% = D, below 60% = F

### TOPICAL OUTLINE AND SCHEDULE:

Week	Date	Topic	Labs & Tests	Homework Problems
1		Ch. 1: PLC Overview Ch. 2: PLC Hardware Components Lab safety document	1. Relay Logic Introduction	1-5 5
2		Ch. 5: Basics of PLC Programming	2. Door Control – relay logic	2,4,6
3		Ch. 6: Developing Fundamental PLC Wiring Diagrams and Ladder Logic Programs	3. Silo Control – relay logic	3,9,11
4		Ch. 7: Programming Timers	<b>Test 1</b>	3,7,12
5		Ch. 8: Programming Counters	4. Traffic Control - timers	3,5,8
6		Ch. 9: Program Control Instructions – jump, subroutine, forcing, temporary end	5. Batch Mix - counters	1,2,3,4
7		Ch. 10: Data Manipulation Instructions	6. Program Control Lab Manual 9-7,8,9	3,7,8,11
8		Ch. 11: Math Instructions	<b>Test 2</b>	1,7
9		Ch. 12: Sequencer and Shift Register Instructions	7. Data Manipulation Lab Manual 10-31	1,4
<b>None</b>		<b>Spring Break - No class</b>		
10		Ch. 13: Installation Practices and Troubleshooting	8. Shift Register Lab Manual 12-17	1-3, 5-13
11		Ch. 14: Process Control and Data Acquisition	<b>Test 3</b>	1-7
12		Communications using RSLinx Computer/PLC serial Ethernet and messaging	Project (team) – Understanding the problem	
13		Ethernet, HMI Programming	Project - Design	
14		HMI Programming	Project – Design & test operation	
15		Oral presentations [Handout], Evaluation	Project – Demonstration	
16		<b>Final Exam. Project Report due</b>		

### MIAMI UNIVERSITY LEARNING COMMUNITY:

Miami University is committed to fostering a supportive learning environment for all students irrespective individual differences in gender, race, national origin, religion, handicapping condition, sexual preference, or age. Students should expect, and help create, a learning environment free from all forms of prejudice. Disparaging comments, sexist or racist humor, or questioning the academic commitment of students based upon these individual differences is behaviors that undermine our learning community. If such behaviors occur in class, please seek the assistance of your instructor or department chair.

### NOTES:

1. The instructor may make changes as deemed necessary.
2. The order may be changed depending upon students'/instructor's needs.
3. Homework assignments and laboratory reports are due at the beginning of the next class meeting.
4. Late submissions of assignments will result in a reduced grade.