



Course Syllabus

Course EET2440 Course Name: Programmable Controllers 1

Division: Engineering & Industrial

Class Days: Monday/Wednesdays

Class Time:

Location: Classroom: E-105

Laboratory: E-101/105

Credit Hours: 4 Contact Hours: 6

Lab Hours: 3 Lecture Hours: 3

Instructor: Steve Karr

Office Location: E-215-K

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Office Hours:

Division Office/Location: E-107

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Full-time Contact Person: Steve Karr

Phone(s): 419-559-2453 800-334-3886

Course Description:

A study of the programming and troubleshooting of state-of-the-art programmable controllers used in today's automated factories. This course has the student apply Programmable Controllers to actual industrial situations, as well as to design programs and documentation to solve problems in industrial control.

Purpose and Scope:

This course will study the basic theory of operation of programmable controllers and their applications. The focus of this course will be on the technician learning to diagram, program, and trouble-shoot industrial programmable controllers. The primary controller used is the Allen-Bradley PLC-5 family, and RS Logix 5 software.

Prerequisite(s): EET1360 (Industrial Electronics) or instructor permission

Entry Level Skills and Knowledge: Computer literacy

Co-requisite(s): EET2400 Motor Controls

Required Texts, Supplies and Equipment:

TEXT: Programmable Logic Controllers by Frank Petrozella

2 - 3.5 inch Floppy disks, preferably 1.44 Megabyte (HD)

EET2440 – Note, lab, and project packet.

Grading:

The final grade for this course will be derived from the average of three (3) written tests, one (1) lab test, three (3) projects, and student participation.

(The department reserves the right to modify this for unexpected circumstances.)
Make up exams will be at the discretion of the instructor.

100- 92 = A
91- 84 = B
83- 76 = C
75- 68 = D
67- 0 = F

Learning Outcomes:

General Education

1. **Communicate effectively**
2. **Evaluate arguments in a logical fashion**—Competence in analysis and logical argument are explicit learning goals for most general education programs, although these skills go by a variety of names (e.g., critical thinking, analysis, logical thinking, etc.). **Students will be able to demonstrate competence in problem solving in communication, mathematics, and in team settings.**
3. **Employ the methods of inquiry characteristic of natural sciences, social sciences, mathematics, and the arts and humanities;** general education introduces students to methods of inquiry in several fields of study and thereby prepares students to integrate information from different disciplines.

General Education:

Communicate effectively

Evaluate arguments in a logical fashion—Competence in analysis and logical argument are explicit learning goals for most general education programs, although these skills go by a variety of names (e.g., critical thinking, analysis, logical thinking, etc.). Students will be able to demonstrate competence in problem solving in communication, mathematics, and in team settings.

Demonstrate an understanding of cultural differences and the knowledge of how to work effectively in a global and diverse culture and society.

Mathematics: Problem solving

Reasoning

Connecting with other disciplines

Communicating

Using Technology

Developing math power

Number sense
Function

Oral & written communication skills: Problem solve
Evaluate sources
Organize
Listen
Use conventions of standard English
Communicate effectively orally

Technical

1. Observe all safety rules pertaining to programmable controllers.
2. Explain the operation of timers and counter on Allen-Bradley Programmable Controllers.
3. Explain and utilize the Allen-Bradley PLC-5 Programmable Controller.
4. Trouble-shoot both the software and hardware portions of a programmable controller system.
5. Understand different numbering systems and how they are used in programmable controller systems.
6. Design a basic software program on a programmable controller to perform a designated machine sequence.
7. Interpret the element addressing of an Allen-Bradley PLC-5 Programmable Controller.
8. Display a good working knowledge of PLC's and the terminology used by professionals in the PLC field.
9. Write a program to utilize file-to-file moves to load multiple presets into timers.
10. Completely document a programmable controller project, complete with a hard copy of the text and ladder file, as well as an I/O diagram.
11. Utilize the Rockwell RSLOGIX 5 software to search for instructions in a program.
12. Interpret electrical prints, by identifying and explaining the power circuit and control circuit of the machine.
13. Understand the memory format, addressing, as well as data, of the AB PLC-5.
13. Troubleshoot a working PLC-5 system.
14. Explain how a multiplexer card operates.
15. Explain how Thumbwheel and LED displays are properly connected to a PLC
16. Connect a computer to any PLC-5 processor using a Linx Gateway connection.

Assessment of Student Learning:

This course may include a project that is one of several that will be used by faculty to assess student academic performance in the program. A panel of faculty will review all (projects or whatever assessment activity you are doing), then assess and summarize the academic performance of students at this point in the program. The results of this assessment will be shared among the department faculty, used to identify needed changes or improvements, and submitted to the Student Academic Assessment Committee as part of the college's overall student academic assessment effort.

Assessment Project and Measurement in course (if any): None

Plan of Work:

Week	Activities
1.	What is a PLC Basic Intro to PLC's Relay type instructions Basic Intro to PLC-5 PLC-5 Hardware Intro to Rockwell RS Logix 5 Software PLC-5 Addressing
2.	Introduction to Linx Gateway Linx Driver Configurations
3.	PLC-5 File Layout
4.	Basic Ladder instructions Introduction to RSLogix 500 Emulator
5.	PLC-5 Timers
6.	Test 1 & Project 1 due
7.	PLC-5 Counters
8.	PLC Documentation and Interpretation Interpreting Hardware Prints Troubleshooting PLC-5 PLC's
9.	Searching & Forcing in a PLC-5 environment
10.	Allen Bradley PLC-5 Rack and Processor Configuration
11.	Test 2 & Project 2 due
12.	Multiplexer card, thumbwheels, and LED displays Numbering System - Binary - BCD - Integer

12. Math instructions
13. Compare & Compute instructions
14. Files, File to File Moves, Word to File Moves, Files to Words Moves
Indexed addressing, Bit shift instructions
15. Test 3 & Project 3 due

Course Requirements:

The student is expected to attend each class and be on time for the start of class.

Any project or test assigned to a student should be performed by only that particular student, unless otherwise specified by the instructor.

Computer disk maintenance is the full responsibility of the student. Back up and save often. Check for viruses each time you use any lab. Please report machine problems to your instructor.

The instructor may modify the sequence of this material throughout the quarter to better meet the needs of the class.

Policies

Course Withdrawing: If for any reason you need to withdraw from this course, be certain that you do so according to College procedure. It is your responsibility to know and follow this procedure. If you simply stop coming to class, without officially withdrawing from the course, your grade is an automatic "F." Please follow official College procedure for withdrawing from this or any course.

College Academic Policies are located in the College Catalog. A copy of the current catalog may be picked up in any of the divisional offices or admissions. The list of college policies are also available online at <https://www.terra.edu/register/Collegecat/policies.asp>.

Support Services: The College offers a number of support services to assist in your success in this course and all courses. Among these services are the Writing & Math Center in B105, the Office of Learning Support Services, which coordinates the campus disability services and tutoring programs, the computer labs, and the computers in the atriums.

Any student who feels he/she may need an accommodation based on the documentation of a disability should the Office of Learning Support Services privately to discuss his/her specific issues. Please contact the OLSS at (419) 334-8400 X 208 or visit 100 Roy Klay Hall (Building A) to coordinate reasonable accommodations.

If you have a documented disability and are receiving academic accommodations through the Office of Learning Support Services, please schedule a meeting with me in a timely manner so that we may discuss how these services will be arranged.

Tutoring services are available to students beginning the second week of every quarter. Students requesting tutoring services should obtain a tutor request form from the OLSS in 100 Roy Klay Hall

(Building A) or online at the Terra website. Please note that instructor verification and acceptance of the Student Learner Agreement is necessary for all tutoring requests. All requests should be submitted to 100 Roy Klay Hall (Building A).

As a courtesy to your Instructor and fellow students, please turn off your cell phone and pagers or place in vibrate mode. Please take and place your calls outside of the classroom. Emergency Personnel excluded.

Do not modify, add, or delete any programs, drivers, screen savers, etc. from the Computers in E-101 or E-105. Doing so will result in your removal from class.