

Administrative Master Syllabus

Course Information

Course Title	Programmable Logic Controllers
Course Prefix, Num. and Title	ELMT 1301 - Programmable Logic Controllers
Division	Technology and Business
Department	Electronics Engineering Technology
Course Type	WECM Course
Course Catalog Description	An introduction to programmable logic controllers as used in industrial environments including basic concepts, programming, applications, troubleshooting of ladder logic, and interfacing of equipment. Laboratory experience in programming and interfacing commercial PLCs. This is the capstone experience for the Industrial Electronics L1 certificate.
Pre-Requisites	None
Co-Requisites	None

Semester Credit Hours

Total Semester Credit Hours (SCH): Lecture Hours: Lab/Other Hours	3:3:1
Equated Pay Hours	3.5
Lab/Other Hours Breakdown: Lab Hours	1
Lab/Other Hours Breakdown: Clinical Hours	0
Lab/Other Hours Breakdown: Practicum Hours	0
Other Hours Breakdown	0

Approval Signatures

Title	Signature	Date
Department Head:	David Kucera, Electronics Engineering Technology Program Director	10-26-2023
Division Chair:	David Kucera, Technology & Business Division Chair	10-26-2023
VPI:		

Additional Course Information

Topical Outline: Each offering of this course must include the following topics (be sure to include information regarding lab, practicum, and clinical or other non-lecture instruction).

The following performance will be expected of any student completing this course with a passing grade. There is no absolute time limit on the performance of these objectives, unless noted, but the grade received by the student will depend, in part, on the relative speed and precision of the student's performance in these tasks. Where subjective evaluations are indicated, the instructor will make these judgments based on his or her knowledge of the skills required to place a graduate with the expectation of successful on-job performance.

The student will be expected to show understanding the following in written examination or laboratory demonstration:

- Describe a Programmable Logic Controller.
- Explain how instructions get into a PLCs memory.
- Demonstrate ability to successfully test use BCD, Octal and Hexadecimal number systems.
- Correctly explain the different data formats used in common PLCs.
- Use ladder logic to solve algorithms.
- Draw a correct ladder logic diagrams.
- Program PLCs with correct ladder logic.
- Describe sinking and sourcing as related to input modules.
- Correctly explain TTL output modules.
- Program and explain relay output modules.
- Properly use surge suppression in output modules.
- Explain basic relay instructions
- Program a PLC for normally closed instruction.
- Set up a PLC for normally open PLC instruction.
- Use a PLC to perform timing and counting.

Course Learning Outcomes:

Learning Outcomes – Upon successful completion of this course, students will:

1. Explain terminology
2. Select/Identify hardware components
3. Predict PLC operation based on ladder logic diagrams
4. Program a PLC to perform various control functions

Methods of Assessment:

Outcomes 1,2,3,4 are assessed by:

- Exams
- Homework
- Labs
- Quizzes

Required text(s), optional text(s) and/or materials to be supplied by the student:

An appropriate electronics text or industrial documents covering PLCs. Example-Introduction to Programmable Logic Controllers by Dunning, Calculator – scientific with Sine, Cosine, Tangent capabilities

Suggested Course Maximum:

20 lecture, 20 laboratory

List any specific or physical requirements beyond a typical classroom required to teach the course.

Lecture facilities for 20 students. Laboratory facilities for 20 students must include 10 bench positions each with a digital meter, logic probe, 50 MHz oscilloscope and probes, bread boarding facility with power supply and signal generator, industry PLCs, and a stock of basic circuit components.

Course Requirements/Grading System: Describe any course specific requirements such as research papers or reading assignments and the generalized grading format for the course.

Evaluation of Performance:

Course grades will be determined by the percentage of course objectives for which the student can demonstrate mastery and by attendance. Mastery of course objectives will be determined by written examinations, physical soldering exams, an attendance grade as described in the Departmental Policy handout, a daily work grade which will include graded homework, graded laboratory work, and a comprehensive final exam.

Approximate Grade Evaluation Summary:

Major tests	60%
Attendance	10%
Lab reports, homework, and quizzes.....	15%
Final examination	15%

Grade Scale:

90 to 100	A
80 to 89	B
70 to 79	C
60 to 69	D
0 to 59	F

Curriculum Checklist:

- Administrative General Education Course** (from ACGM, but not in WCJC Core) – No additional documents needed.
- Administrative WCJC Core Course.** Attach the Core Curriculum Review Forms
 - Critical Thinking
 - Communication
 - Empirical & Quantitative Skills
 - Teamwork
 - Social Responsibility
 - Personal Responsibility
- WECM Course** -If needed, revise the Program SCANS Matrix and Competencies Checklist