IMPERIAL VALLEY COLLEGE

Basic Course Information

Semester:	**Spring 2025**	Instructor Name:	Ricardo Jimenez
Course Title & #:	EWIR162 Programmable Logic Controllers	Email:	ricardo.jimenez@imperial.edu
CRN #:	**1**	Webpage (optional):	
Classroom:	**3110**	Office #:	**3110**
Class Dates:	**2/10/2025—6/10/2025**	Office Hours:	7:00.—8:00 A.M.
Class Days:	**Saturdays**	Office Phone #:	
Class Times:	8:00 A.M.—1:45 P.M.	Emergency Contact:	
Units:	3	Class Format:	Face-to-face (on ground)

Course Description

This course introduces the fundamentals of Programmable Logic Controllers (PLCs) which are used in industrial, commercial, and process applications. Students will learn to program, maintain, troubleshoot, and modify PLCs and controlled systems. Software interfaces will be used to write, enter, and execute PLC applications. (CSU)

Course Prerequisite(s) and/or Co-requisite(s)

A. PREREQUISITES, if any:
B. COREQUISITES, if any:
C. RECOMMENDED PREPARATION, If any:
D. RECOMMENDED COMPANION COURSE, if any:

GRADING CRITERIA
Letter Grade Only

Student Learning Outcomes

Upon Course Completion, the successful student will have acquired new skills, knowledge, and or attitudes as demonstrated by being able to:

1. Design, Construct, and develop, working PLC Programs using PLC instructions, identify the four key elements that make up a closed loop process control system, Troubleshoot a PLC.
2. Familiarize with PLC technologies and their installation standards
3. Describe and Program the functions of how PLCs are selected and configured, and their related equipment according to NFPA standards.

Course Objectives

Upon satisfactory completion of the course, students will be able to:

1. *Define and describe how PLCs are selected and configured*
2. *Identify the Input/Output (I/O) sections of programmable controllers*
3. *Describe the programming section and describe programming devices, symbols and languages.*

4. *Identify and describe how programmable timers work*
5. *Construct different PLC applications and controller applications*
6. *Explain how PLCs are used within software/hardware interfaces, write, enter and execute a network applications.*
7. *Explain and identify how to troubleshoot input/output modules and devices*

Textbooks & Other Resources or Links

- *Glen A. Mazur, William j. Weindorf, 2020. Programmable Logic Controllers, Principles and Applications. 3rd Edition, American Technical Publishers. ISBN: 978-0-8269-8*

Click Software from Automation Direct.

Course Requirements and Instructional Methods

Assignments are designed to elicit your demonstration of critical thinking, understanding and application of the course concepts, and your proficiency in the subject matter.

Required Activities or Assignments Points
1. Homework, Assignments: 10
2. Laboratory Experiments/projects: 40
3. Laboratory Reports: 10
3. Mid-Term Exam: 20
4. Final Exam: 20

Teaching Methods: Discussion of assignments and instructional methods will be a combination of all methods of instruction, which can be classified as telling, lecturing, or discussing; showing or demonstrating.

Out of Class Assignments: The Department of Education policy states that one (1) credit hour is the amount of student work that reasonably approximates not less than one hour of class time and two (2) hours of out-of-class time per week over the span of a semester. WASC has adopted a similar requirement.

Course Grading Based on Course Objectives

Course Policies

The course grade is based on total points accumulated during the semester. There is a maximum of 100 points. Very limited extra credit points may be available, either through some class participation activity, group work or perfect attendance. Failing to turn in regular assignments will stop you from being able to earn extra credit points and late assignments will have points subtracted.

Final Grades are calculated as follows:

Points	Grade
90-100	A
80-89	B
70-79	C
60-69	D
Below 60	F

Grading Rubrics: In addition to the percentages and points listed above the following grading rubric (standards expected) will be used when grading student assignments. The description that best fits your work will be the assigned grade.

Grade	Rubric or Standard Expected
A	Focused and clearly organized. Contains advanced critical thinking and analysis. Convincing evidence is provided to support conclusions. Clearly meets or exceeds assignment requirements.

B	Generally focused with some development of ideas, but may be simplistic or repetitive. Evidence is provided to support conclusions. Occasional grammatical errors. Meets assignment requirements, but does not exceed.
C	Unfocused, underdeveloped, or rambling, but has some coherence. Minimal evidence is provided to support conclusions. Several grammatical errors. Meets minimum assignment requirements.
D	Unfocused, underdeveloped, and/or rambling. Limited evidence is used to support conclusions. Serious grammatical errors that impede overall understanding. Does not address the assignment requirements
F	Unfocused, underdeveloped, and/or rambling. Incomplete or too brief. No evidence is used to support conclusions. Serious grammatical errors that block overall understanding. Does not meet assignment requirements. Minimal to no student effort.

Late Assignments will be accepted until the graded assignment is returned to the class, but assessed a penalty of 10 points per calendar day it is late.

Attendance

- A student who fails to attend the first meeting of a class or does not complete the first mandatory activity of an online class will be dropped by the instructor as of the first official meeting of that class. Should readmission be desired, the student's status will be the same as that of any other student who desires to add a class. It is the student's responsibility to drop or officially withdraw from the class. See General Catalog for details.
- Regular attendance in all classes is expected of all students. A student whose continuous, unexcused absences exceed the number of hours the class is scheduled to meet per week may be dropped. For online courses, students who fail to complete required activities for two consecutive weeks may be considered to have excessive absences and may be dropped.
- Absences attributed to the representation of the college at officially approved events (conferences, contests, and field trips) will be counted as 'excused' absences.

Classroom Etiquette

- Electronic Devices: Cell phones and electronic devices must be turned off and put away during class, unless otherwise directed by the instructor.
- Food and Drink are prohibited in all classrooms.   Water bottles with lids/caps are the only exception.   Additional restrictions will apply in labs. Please comply as directed by the instructor.
- Disruptive Students: Students who disrupt or interfere with a class may be sent out of the room and told to meet with the Campus Disciplinary Officer before returning to continue with coursework. Disciplinary procedures will be followed as outlined in the General Catalog.
- Children in the classroom: Due to college rules and state laws, only students enrolled in the class may attend; children are not allowed.

Academic Honesty

Academic honesty in the advancement of knowledge requires that all students and instructors respect the integrity of one another's work and recognize the important of acknowledging and safeguarding intellectual property.
There are many different forms of academic dishonesty. The following kinds of honesty violations and their definitions are not meant to be exhaustive. Rather, they are intended to serve as examples of unacceptable academic conduct.

Anyone caught cheating or plagiarizing will receive a zero (0) on the exam or assignment, and the instructor may report the incident to the Campus Disciplinary Officer, who may place related documentation in a file. Repeated acts of cheating may result in an F in the course and/or disciplinary action. Please refer to the General Catalog for more information on academic dishonesty or other misconduct. Acts of cheating include, but are not limited to, the following: (a) plagiarism; (b) copying or attempting to copy from others during an examination or on an assignment; (c) communicating test information with another person during an examination; (d) allowing others to do an assignment or portion of an assignment; (e) using a commercial term paper service.

- Plagiarism is taking and presenting as one's own the writings or ideas of others, without citing the source. You should understand the concept of plagiarism and keep it in mind when taking exams and preparing written materials. If you do not understand how to "cite a source" correctly, you must ask for help.
- Cheating is defined as fraud, deceit, or dishonesty in an academic assignment, or using or attempting to use materials, or assisting others in using materials that are prohibited or inappropriate in the context of the academic assignment in question.

Other Course Information

CORE CONTENT:

Lecture outline:

1. Introduction to Digital Logic and binary systems
2. Introduction to fundamentals of Programmable Logic Controllers (PLCs)
3. Structures, types, and performance of PLCs.
4. Identify, Illustrate, and apply PLC input/output components plan
5. Design, characteristics, and standards
6. PLCs systems commercial/industrial
7. PLCs and equipment troubleshooting program.

Lab Outline:

1. Identification of the input/output (I/O) sections of programmable logic controllers (PLCs)
2. Students will work with PLCs and structure types. Symbols will be examined and diagrams will be followed to assemble PLCs.
3. Students will identify and wire different types of outlets
4. Students will use PLC programs to design working functions using symbols
5. Students will practice troubleshooting input/output modules and devices
6. Construct working PLC programs and preparation techniques.

IVC Student Resources

Additional Student Services

- CANVAS LMS. Canvas is Imperial Valley College's main Learning Management System. To log onto Canvas, use this link: Canvas Student Login. The Canvas Student Guides Site provides a variety of support available to students 24 hours per day. Additionally, a 24/7 Canvas Support Hotline is available for students to use: 877-893-9853.
- Learning Services.   There are several learning labs on campus to assist students through the use of computers and tutors. Please consult your Campus Map for the Math Lab; Reading, Writing & Language Labs; and the Study Skills Center.
- Library Services.   There is more to our library than just books. You have access to tutors in the Study Skills Center, study rooms for small groups, and online access to a wealth of resources.

Disabled Student Programs and Services (DSPS)

Any student with a documented disability who may need educational accommodations should notify the instructor or the Disabled Student Programs and Services (DSP&S) office as soon as possible. The DSP&S office is located in Building 2100, telephone 760-355-6313. Please contact them if you feel you need to be evaluated for educational accommodations.

Student Counseling and Health Services

Students have counseling and health services available, provided by the pre-paid Student Health Fee.

- **Student Health Center**. A Student Health Nurse is available on campus. In addition, Pioneers Memorial Healthcare District provide basic health services for students, such as first aid and care for minor illnesses. Contact the IVC Student Health Center at 760-355-6128 in Room 1536 for more information.
- **Mental Health Counseling Services**. Short-term individual, couples, family and group counseling services are available for currently enrolled students. Services are provided in a confidential, supportive, and culturally sensitive environment. Please contact the IVC Mental Health Counseling Services at 760-355-6310 or in the building 1536 for appointments or more information..

Veteran's Center

The mission of the IVC Military and Veteran Success Center is to provide a holistic approach to serving military/veteran students on three key areas: 1) Academics, 2) Health and Wellness, and 3) Camaraderie; to serve as a central hub that connects military/veteran students, as well as their families, to campus and community resources. Their goal is to ensure a seamless transition from military to civilian life. The Center is located in Building 600 (Office 624), telephone 760-355-6141.

Extended Opportunity Program and Services (EOPS)

The Extended Opportunity Program and Services (EOPS) offers services such as priority registration, personal/academic counseling, tutoring, book vouchers, and community referrals to qualifying low-income students. EOPS is composed of a group of professionals ready to assist you with the resolution of both academic and personal issues. Our staff is set up to understand the problems of our culturally diverse population and strives to meet student needs that are as diverse as our student population. Also under the umbrella of EOPS our CARE (Cooperative Agency Resources for Education) Program for single parents is specifically designed to provide support services and assist with the resolution of issues that are particular to this population. Students that are single parents receiving TANF/Cash Aid assistance may qualify for our CARE program, for additional information on CARE please contact Lourdes Mercado, 760-355- 6448, lourdes.mercado@imperial.edu.

EOPS provides additional support and services that may identify with one of the following experiences:

- Current and former foster youth students that were in the foster care system at any point in their lives
- Students experiencing homelessness
- Formerly incarcerated students

 To apply for EOPS and for additional information on EOPS services, please contact Alexis Ayala, 760-355-5713, alexis.ayala@imperial.edu.

Student Equity Program

- The Student Equity Program strives to improve Imperial Valley College's success outcomes, particularly for students who have been historically underrepresented and underserved. The college identifies strategies to monitor and address equity issues, making efforts to mitigate any disproportionate impact on student success and achievement. Our institutional data provides insight surrounding student populations who historically, are not fully represented. Student Equity addresses disparities and/or disproportionate impact in student success across disaggregated student equity groups including gender, ethnicity, disability status, financial need, Veterans, foster youth, homelessness, and formerly incarcerated students. The Student Equity Program provides direct supportive services to empower students experiencing insecurities related to food, housing, transportation, textbooks, and shower access. We recognize that students who struggle meeting their basic needs are also at an academic and economic disadvantage, creating barriers to academic success and wellness. We strive to remove barriers that affect IVC students' access to education, degree and certificate completion, successful completion of developmental math and English courses, and the ability to transfer to a university. Contact: 760.355.5736 or 760.355.5733 Building 100.
- The Student Equity Program also houses IVC's Homeless Liaison, who provides direct services, campus, and community referrals to students experiencing homelessness as defined by the McKinney-Vento Act. Contact: 760.355.5736 Building 100.

Student Rights and Responsibilities

Students have the right to experience a positive learning environment and to due process of law. For more information regarding student rights and responsibilities, please refer to the IVC General Catalog.

Information Literacy

Imperial Valley College is dedicated to helping students skillfully discover, evaluate, and use information from all sources. The IVC Library Department provides numerous Information Literacy Tutorials to assist students in this endeavor.

Anticipated Class Schedule/Calendar

[Provide a tentative overview of the readings, assignments, tests, and/or other activities for the duration of the course. A table format as in the example below may be used for this purpose.]

Date or Week	Activity, Assignment, and/or Topic	Pages/ Due Dates/Tests
Week 1	Introduction to PLCs, architecture and block diagrams	HW#1 due date: Week #2
Week 2	Ladder Diagrams for PLCs. HW#2	HW#2 due date: Week #2
Week 3	Temperature scales and measurements. Introduction to Programmable Logic Controllers PLCs. HW#3.	HW#3 due date: Week #3
Week 4	Signal conditioning using Instrumentation Amplifier (IA), PLCs and Microcontrollers. HW#4.	HW#4 due date: Week #3
Week 5	Temperature and Humidity Sensors using PLCs. HW#5	HW#5 due date: Week #4
Week 6	Pressure, Flow, and Level sensors HW#6	HW#6 due date: Week #5
Week 7	Midterm Project and Test. HW#7	due date: Week #5, Midterm test
Week 8	Logic functions on PLCs. HW#8	HW#8 due date: Week #6
Week 9	Programmable Timers on PLC applications. HW#9	HW#9 due date: Week #7
Week 10	Sensors diagnosis and repair. HW#10	HW#10 due date: Week #7
Week 11	Automated Conveyor systems operation and Set up. HW#11	HW#11 due date: Week #8
Week 12	PLCs on irrigation systems. HW#12	HW#12 due date: Week #8
Week 13	Automated systems using digital modules based on PLCs. Assignment1	Assigm#1 due date: Week #9
Week 14	Automated systems using Microcontrollers in Ag Applications. Project	Project due date: Week #9
Week 15	Final Project and Test	

Subject to change without prior notice