Glendale College

Course Outline of Record Report

Course ID 001454

Revision - April 2025

ECT210 : Programmable Logic Controllers (PLC)

General Information

Author:	• Christopher Herwerth
Attachments:	Distance Education (DE) Individual Course Addendum Form - ECT_210 (CE) COR 5:26:21 Code 6:13:21.pdf
Course Code (CB01) :	ECT210
Course Title (CB02) :	Programmable Logic Controllers (PLC)
Department:	ECT
Proposal Start:	Spring 2026
TOP Code (CB03) :	(0934.00) Electronics and Electric Technology
CIP Code:	(47.0101) Electrical/Electronics Equipment Installation and Repair Technology/Technician, General.
SAM Code (CB09) :	C - Clearly Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	Yes
Course Control Number (CB00) :	CCC000591648
Curriculum Committee Approval Date:	04/23/2025
Board of Trustees Approval Date:	06/17/2025
Last Cyclical Review Date:	04/23/2025
Course Description and Course Note:	ECT 210 explores Programmable Logic Controller (PLC) operations, including PLC installation and programming techniques. Students learn to use programming interface in order to troubleshoot applications in industry. Students also practice practical programming and operating skills used in the maintenance of automated systems.
Justification:	Mandatory Revision
Academic Career:	• Credit
Mode of Delivery:	• In-Person • Remote • Hybrid • Online
Author:	No value
Course Family:	No value

Academic Senate Discipline

Primary Discipline:	• Electronic Technology (Radio, television, computer repair, avionics)
Alternate Discipline:	No value
Alternate Discipline:	No value

Course Development

Basic Skill Status (CB08)

Course is not a basic skills course.

☐ Allow Students to Gain Credit by Exam/Challenge

Course Special Class Status (CB13)

Course is not a special class.

Pre-Collegiate Level (CB21)

Not applicable.

Grading Basis

- Grade with Pass / No-Pass Option

Course Support Course Status (CB26)

Course is not a support course

General Education and C-ID

General Education Status (CB25)

Not Applicable

Transferability

Transferable to CSU only

Transferability Status

Approved

Units and Hours

Summary

Minimum Credit Units (CB07)	3
Maximum Credit Units (CB06)	3
Total Course In-Class (Contact) Hours	90
Total Course Out-of-Class Hours	72
Total Student Learning Hours	162

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

☐ Variable Credit Course

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	2	4
Laboratory Hours	3	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	0
Course In-Class (Contact) Hours	
Lecture	36

Laboratory	54
Studio	0
Total	90

Course Out-of-Class Hours

Lecture	72
Laboratory	0
Studio	0
Total	72

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Prerequisites, Corequisites, Recommended Corequisites, and Recommended Preparation

Prerequisite

ECT110 - Electricity and Electronics Principles

Objectives

- Determine the value of resistors from their color code, measure DC (Direct Current) and AC (Alternating Current) voltage.
- Identify conductors and insulators, and test common types of switches.
- Measure current in a circuit, verify ohms law, investigate errors in measurement.
- Design a series and parallel circuit that will meet specified resistance requirements.
- Develop a general rule for calculating the voltage across each resister in an unloaded and loaded resistive voltage divider.
- Develop methods of troubleshooting circuits using voltage, current, capacitor, and resistance measurements.
- Identify the operating controls of an oscilloscope.
- Identify the controls and features of an audio frequency generator.
- Describe the effect of AC and DC electrical motors and inductance.
- Identify and measure affect transformers and magnetic relays and contactors.

Entry Standards

Entry Standards	Description
Demonstrate control of verb tenses in active and passive voice, gerunds and infinitives, conditionals real and unreal, adjective, noun, and adverb clauses, and transitional expressions.	No Value
Comprehend multi-paragraph reading passages in textbooks.	No Value
Describe basic laboratory equipment and components.	No Value

Course Limitations

Cross Listed or Equivalent Course	Description
No value	No value

Specifications

Methods of Instruction

Methods of Instruction	
Methods of Instruction	Lecture
Methods of Instruction	Laboratory
Methods of Instruction	Multimedia
Methods of Instruction	Collaborative Learning
Methods of Instruction	Demonstrations

Methods of Instruction	Presentations

Out of Class Assignments

- Calculations (e.g., given logic ladder input and output current of controlled system, calculate time delay of sequential processing)
- Individual project (e.g., create a relay ladder logic, output for controlling a motor)
- Group project (e.g., create an automation process using PLC for power consumption)

Methods of Evaluation	Description of Activity/Interaction
Exam/Quiz/Test	Regular quizzes
Exam/Quiz/Test	Mid-term examination
Exam/Quiz/Test	Final examination
Exam/Quiz/Test	Laboratory practical examination
Project/Portfolio	Evaluation of final project

Textbook Rationale

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Glen A. Mazur, William J. Weindorf	Programmable Logic Controllers Principles and Applications	American Technical Publishers	2021	978-0-8269-1396-8

Other Instructional Materials (i.e. OER, handouts)

No Value

Learning Outcomes

Course Objectives

Apply safety considerations when working on PLC systems.

Demonstrate the electrical properties associated with PLCs.

Identify the use of symbols in PLC’s software for programing the PLCs.

Predict the functions and different variation of the PLC sections.

Identify the installation consideration regarding electrical properties and PLCs.

Operate the maintenance process for PLC's hardware and software.

Employ troubleshooting principles and test instruments for PLCs.

SLOs

Operate and troubleshoot programmable logic controller hardware and software autonomous functions. Expected Outcome Performance: 70.0

Implement a programmable logic controller system that performs an automatic physical task or set of tasks. Expected Outcome Performance: 70.0

Describe the overall function of programmable logic controllers (PLCs) and their uses in automation applications in industry. Expected Outcome Performance: 70.0

Additional SLO Information

Does this proposal include revisions that might improve student attainment of course learning outcomes?

No

Is this proposal submitted in response to learning outcomes assessment data?

No

If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.

No Value

SLO Evidence

No Value

Course Content

Lecture Content

PLC and Electrical Safety (4 hours)

- PLC definition
- Electrical properties
- Grounding system
- Safety consideration
- Personal protection
- Inspecting a PLC system

Electrical Principles and PLCs (3 hours)

- PLC power supply
- Input/output voltage rating
- Input/output current rating
- Input switches
- PLC series circuit properties
- PLC parallel circuit properties

Electrical Circuits and PLCs (3 hours)
- Electrical symbols and diagrams
- Logic functions
- Logic gate circuits
- PLC wiring methods

PLC Hardware (3 hours)
- PLC input/output sections
- PLC central processing units
- PLC programming devices
- PLC operating cycle

PLC Programming Instructions (3 hours)
- Programming diagrams
- File addresses
- Scan execution

Programming PLC Timers and Counters (2 hours)
- Timer and Counter instructions
- Special applications

PLC and System Interfacing (3 hours)
- Primary systems
- System interfacing
- Electromechanical relays
- Solid-state relays
- Motor starter interfaces
- Electric motor drive interfacing

PLC Installations and Startup (2 hours)
- PLC installation safety
- Input/output checks
- Program checks

PLC and System Maintenance (3 hours)
- Visual inspection
- Energized PLC maintenance
- Software and program verification

Troubleshooting Principles and Test Instruments (2 hours)
- Troubleshooting methods
- Measurement precautions
- Tester measurement procedures

Troubleshooting PLC Hardware (2 hours)
- Troubleshooting input/output modules

Troubleshooting with PLC Software (2 hours)
- Viewing PLC programs
- Debugging PLC programs
- Temporary end instruction
- Software help features

Analog Principles (2 hours)
- Analog and digital circuits
- Variable frequency drive circuits
- Analog input/output devices

Analog Device Installation and PLC Programming (2 hours)
- Wiring analog input/output devices
- Analog device programming setup
- PLC actuator installation

- Troubleshooting PLC actuators and actuator wiring

Total Hours: 36

Laboratory/Studio Content

Electrical Principles and PLCs (4 hours)
- PLC power supply
- Input/output voltage rating
- Input/output current rating
- Input switches
- PLC series circuit properties
- PLC parallel circuit properties

Electrical Circuits and PLCs (4 hours)
- Electrical symbols and diagrams
- Logic functions
- Logic gate circuits
- PLC wiring methods

PLC Hardware (5 hours)
- PLC input/output sections
- PLC central processing units
- PLC programming devices
- PLC operating cycle

PLC Programming Instructions (4 hours)
- Programming diagrams
- File addresses
- Scan execution

Programming PLC Timers and Counters (4 hours)
- Timer and Counter instructions
- Special applications

PLC and System Interfacing (5 hours)
- Primary systems
- System interfacing
- Electromechanical relays
- Solid-state relays
- Motor starter interfaces
- Electric motor drive interfacing

PLC Installations and Startup (4 hours)
- PLC installation safety
- Input/output checks
- Program checks

PLC and System Maintenance (4 hours)
- Visual inspection
- Energized PLC maintenance
- Software and program verification

Troubleshooting Principles and Test Instruments (4 hours)
- Troubleshooting methods
- Measurement precautions
- Tester measurement procedures

Troubleshooting PLC Hardware (4 hours)
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Troubleshooting with PLC Software (4 hours)
- Viewing PLC programs
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Analog Principles (4 hours)

- Analog and digital circuits
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- Analog input/output devices

Analog Device Installation and PLC Programming (4 hours)

- Wiring analog input/output devices
- Analog device programming setup
- PLC actuator installation
- Troubleshooting PLC actuators and actuator wiring

Total Hours: 54

Additional Information

Repeatability

Not Repeatable

Justification (if repeatable was chosen above)

No Value

Is it possible this course will have a material fee?

No

I have contacted my library liaison (https://campusguides.glendale.edu/faculty/liaisons):

Yes

What term(s) will this course be offered?

Fall/Spring

Will any additional resources be needed for this course? (Click all that apply)

- No

If additional resources are needed, add a brief description and cost in the box provided.

No Value

Resources

Did you contact your departmental library liaison?

Yes

If yes, who is your departmental library liason?

Adina Lerner (Technology & Aviation, Visual & Performing Arts)

Did you contact the DEIA liaison?

Yes

Were there any DEIA changes made to this outline?

No

If yes, in what areas were these changes made:

No Value

Will any additional resources be needed for this course? (Click all that apply)

- No

If additional resources are needed, add a brief description and cost in the box provided.

No Value