

Washtenaw Community College Comprehensive Report

ELE 224 Programmable Controllers (PLCs) I Effective Term: Spring/Summer 2023

Course Cover

College: Advanced Technologies and Public Service Careers

Division: Advanced Technologies and Public Service Careers

Department: Advanced Manufacturing

Discipline: Electricity/Electronics

Course Number: 224

Org Number: 14400

Full Course Title: Programmable Controllers (PLCs) I

Transcript Title: Prog. Controllers (PLCs) I

Is Consultation with other department(s) required: No

Publish in the Following: College Catalog , Time Schedule , Web Page

Reason for Submission: Course Change

Change Information:

Pre-requisite, co-requisite, or enrollment restrictions

Rationale: We need to change to a Level I pre-requisite. Students with no background in electricity are self-registering and new advisors are not aware of past practice and also registering students. The Department is aware that the syllabus needs updating and incoming new faculty will handle that. This change is an immediate need.

Proposed Start Semester: Fall 2022

Course Description: This is an introductory, lab-based course which covers PLC hardware, and relay-type, timer, counter, data manipulation, math and program control instructions, with an emphasis on troubleshooting. Weekly labs use Allen Bradley SLC, PLC-5 and ControlLogix controllers and RSLogix software. This course is intended for Industrial Electronics and Mechatronics students, electricians, electrician (and other) apprentices, technicians and engineers. The title of this course was previously Introduction to PLCs.

Course Credit Hours

Variable hours: No

Credits: 4

Lecture Hours: Instructor: 60 Student: 60

Lab: Instructor: 30 Student: 30

Clinical: Instructor: 0 Student: 0

Total Contact Hours: Instructor: 90 Student: 90

Repeatable for Credit: NO

Grading Methods: Letter Grades

Audit

Are lectures, labs, or clinicals offered as separate sections?: NO (same sections)

College-Level Reading and Writing

College-level Reading & Writing

College-Level Math

No Level Required

Requisites

Prerequisite

ELE 111 minimum grade "C-"

General Education

Request Course Transfer

Proposed For:

Student Learning Outcomes

1. Install, troubleshoot and maintain PLC-controlled systems by applying knowledge of PLC hardware, PLC operation, electrical prints, programs, monitoring software, and troubleshooting procedures.

Assessment 1

Assessment Tool: A departmental final exam will be used to assess understanding of key concepts

Assessment Date: Fall 2020

Assessment Cycle: Every Three Years

Course section(s)/other population: At least 3 sections

Number students to be assessed: All students in at least 3 sections

How the assessment will be scored: Departmentally-developed answer key

Standard of success to be used for this assessment: Students will correctly answer 70% of the questions related to the outcome

Who will score and analyze the data: Faculty who teach the class

Assessment 2

Assessment Tool: Departmental lab quizzes will be used to assess proficiency in applying the concepts and in performing hands-on tasks

Assessment Date: Fall 2020

Assessment Cycle: Every Three Years

Course section(s)/other population: At least 3 sections

Number students to be assessed: All students in at least 3 sections

How the assessment will be scored: Departmentally-developed answer key

Standard of success to be used for this assessment: Students will correctly answer 70% of the questions related to the outcome

Who will score and analyze the data: Faculty who teach the class

2. Develop, interpret and troubleshoot PLC programs with relay-type, timer, counter, data manipulation, math and program control instructions using PLC programming and monitoring software.

Assessment 1

Assessment Tool: A departmental final exam will be used to assess understanding of key concepts

Assessment Date: Fall 2020

Assessment Cycle: Every Three Years

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Standard of success to be used for this assessment: Students will correctly answer 70% of the questions related to the outcome

Who will score and analyze the data: Faculty who teach the class

Course Objectives

1. Identify the characteristics of PLC hardware components, including chassis, power supply, CPU, I/O modules.
2. Read and interpret PLC electrical prints and relate them to hardware components.
3. Recognize and apply the operating principles of PLCs including memory, data types, data tables, scan cycle, I/O addresses, number systems, program restrictions and CPU modes.
4. Develop, interpret and troubleshoot ladder logic programs that interface to discrete I/O devices including start and stop buttons, selector switches, pneumatic valves, and motor starters.
5. Develop, interpret and troubleshoot ladder logic containing relay-type instructions, including normally open and normally closed contacts, coils, and combinational logic.
6. Develop, interpret and troubleshoot ladder logic programs that include "bit" instructions, latching outputs, and internal relays.
7. Develop, interpret and troubleshoot ladder logic containing timer instructions, including on-delay and off-delay timers, retentive timers.
8. Develop, interpret and troubleshoot ladder logic containing counter instructions.
9. Develop, interpret and troubleshoot ladder logic containing data manipulation instructions, including move, compare, math, and file manipulation.
10. Develop, interpret and troubleshoot ladder logic containing program control instructions, including jump, subroutine, and MCR.
11. Develop, interpret and troubleshoot ladder logic for simple event-driven sequential systems using structured program design.
12. Use PLC software to create, edit, document, print, download, monitor, test, troubleshoot, print out and back up ladder logic programs.
13. Analyze and troubleshoot complete PLC-controlled systems utilizing a systematic process, electrical prints, software tools, indicator lights, manuals, and test equipment.
14. Identify and demonstrate the proper techniques for PLC installation and maintenance.

New Resources for Course

Course Textbooks/Resources

Textbooks

Petruzella, F. *Programmable Logic Controllers*, ed. McGraw Hill, 2017

Manuals

Petty, D.. ELE 224 Coursepack, Petty, D., 08-01-2017

Periodicals

Software

Equipment/Facilities

Level III classroom

Computer workstations/lab

Reviewer

Faculty Preparer:

Allan Coleman

Action

Faculty Preparer

Date

Aug 05, 2022

Department Chair/Area Director:

Allan Coleman

Recommend Approval

Aug 05, 2022

Dean:*Jimmie Baber**Recommend Approval**Aug 15, 2022***Curriculum Committee Chair:***Randy Van Wagnen**Recommend Approval**Nov 14, 2022***Assessment Committee Chair:***Shawn Deron**Recommend Approval**Nov 16, 2022***Vice President for Instruction:***Victor Vega**Approve**Dec 08, 2022*

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ELE 224 Programmable Controllers (PLCs) I

Effective Term: Spring/Summer 2018

Course Cover

Division: Advanced Technologies and Public Service Careers

Department: Industrial Technology

Discipline: Electricity/Electronics

Course Number: 224

Org Number: 14400

Full Course Title: Programmable Controllers (PLCs) I

Transcript Title: Prog. Controllers (PLCs) I

Is Consultation with other department(s) required: No

Publish in the Following: College Catalog , Time Schedule , Web Page

Reason for Submission: Three Year Review / Assessment Report

Change Information:

Consultation with all departments affected by this course is required.

Course title

Course description

Outcomes/Assessment

Objectives/Evaluation

Rationale: 3 year review and update

Proposed Start Semester: Spring/Summer 2018

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College-Level Math

No Level Required

Requisites

Level II Prerequisite

ELE 111 minimum grade "C-"
or equivalent

General Education

Request Course Transfer

Proposed For:

Student Learning Outcomes

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Assessment 1

Assessment Tool: A departmental final exam will be used to assess understanding of key concepts

Assessment Date: Fall 2020

Assessment Cycle: Every Three Years

Course section(s)/other population: At least 3 sections

Number students to be assessed: All students in at least 3 sections

How the assessment will be scored: Departmentally-developed answer key

Standard of success to be used for this assessment: Students will correctly answer 70% of the questions related to the outcome

Who will score and analyze the data: Faculty who teach the class

Assessment 2

Assessment Tool: Departmental lab quizzes will be used to assess proficiency in applying the concepts and in performing hands-on tasks

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<u>Reviewer</u>	<u>Action</u>	<u>Date</u>
Faculty Preparer: <i>Dale Petty</i>	<i>Faculty Preparer</i>	<i>Jul 05, 2017</i>
Department Chair/Area Director: <i>Thomas Penird</i>	<i>Recommend Approval</i>	<i>Jul 06, 2017</i>
Dean: <i>Brandon Tucker</i>	<i>Recommend Approval</i>	<i>Jul 18, 2017</i>
Curriculum Committee Chair: <i>Lisa Veasey</i>	<i>Recommend Approval</i>	<i>Nov 06, 2017</i>
Assessment Committee Chair: <i>Michelle Garey</i>	<i>Recommend Approval</i>	<i>Nov 07, 2017</i>
Vice President for Instruction: <i>Kimberly Hurns</i>	<i>Approve</i>	<i>Nov 07, 2017</i>