ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Workforce Development Division

COURSE: ELE 1205; Programmable Logic Controllers II

Date: Summer 2014

Credit Hours: 3.0

Prerequisite(s): ELE 1204

Delivery Method:		
☒ **Lecture**	**2 Contact Hours (1 contact = 1 credit hour)**
☐ **Seminar**	**0 Contact Hours (1 contact = 1 credit hour)**
☒ **Lab**	**2 Contact Hours (2 contact = 1 credit hour)**
☐ **Clinical**	**0 Contact Hours (3 contact = 1 credit hour)**
☐ **Online**	
☐ **Blended**	

Offered: ☐ **Fall** ☒ **Spring** ☐ **Summer**

IAI Equivalent –***Only for Transfer Courses***-go to *http://www.itransfer.org*:

CATALOG DESCRIPTION:
This course is a continuation of ELE 1204, emphasizing PLC systems, advanced programming, networking, and troubleshooting.

GENERAL EDUCATION GOALS ADDRESSED

[See the last page of this form for more information.]

Upon completion of the course, the student will be able:

[Choose those goals that apply to this course.]

☐ To apply analytical and problem solving skills to personal, social and professional issues and situations.
☐ To communicate orally and in writing, socially and interpersonally.
☐ To develop an awareness of the contributions made to civilization by the diverse cultures of the world.
☐ To understand and use contemporary technology effectively and to understand its impact on the individual and society.
☐ To work and study effectively both individually and in collaboration with others.
☐ To understand what it means to act ethically and responsibly as an individual in one's career and as a member of society.
☐ To develop and maintain a healthy lifestyle physically, mentally, and spiritually.
☒ To appreciate the ongoing values of learning, self-improvement, and career planning.

EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

[Outcomes related to course specific goals.]

Upon completion of the course, the student will be able to:

With the use of reference materials and with 70% accuracy, the student will be able to:

1. Explain Programmable Controller uses, advantages, and components.
   - Competency 1.1. State why use PLC's at all.
   - Competency 1.2. Explain advantages to using.
   - Competency 1.3. Calculate monetary advantages to PLC use over Relay Logic.
   - Competency 1.4. Correctly Identify and state uses for each component of a PLC system.
   - Competency 1.5. Initialize a PLC.

2. Program a Controller to operate different systems.
   - Competency 2.1. Program a start stop jog.
   - Competency 2.2. Program using a counter and comparators.
   - Competency 2.3. Program a PLC timer application.
   - Competency 2.4. Program a system to convert between decimal, octal, hex, binary and BCD numbers.

3. Utilize a Sequencer program.
   - Competency 3.1. Explain SQI, SQO and SQC instructions.
   - Competency 3.2. State uses for each sequencer.
   - Competency 3.3. Correctly use SQO instruction in a lab setting.
   - Competency 3.4. Demonstrate the SQO to load timers and outputs in the same program.
   - Competency 3.5. Network to another PLC.

4. Properly use HMI Programming Terminals.
   - Competency 4.1. Define HMI terminals.

Competency 4.2. Connect HMI devices To the PLC.
Competency 4.3. Program HMI terminal for a PLC system.

5. Troubleshoot for a PLC system.
   Competency 5.1. Write prints for a PLC job.
   Competency 5.2. Choose the correct wiring for the system.
   Competency 5.3. Troubleshoot some common problems.
   Competency 5.4. Develop a maintenance checklist.
   Competency 5.5. Correctly enter and run/edit a program.

6. Automate a process.
   Competency 6.1. Correctly state in writing the process to be automated.
   Competency 6.2. Correctly use symbols to develop a wiring diagram.
   Competency 6.3. Write a documented program to perform the process.
   Competency 6.4. Write a user manual for the process.

COURSE TOPICS AND CONTENT REQUIREMENTS:

I. Programmable Logic Controllers (PLCs): An Overview

II. Basics of PLC Programming

III. Developing PLC Programs From a Sequence of Operations

IV. Program Timers

V. Program Counters

VI. Program Control Instructions

VII. Data Manipulation Instructions

VIII. Math Instructions

IX. Sequencer Instructions

X. PLC Communications/Networking

XI. HMI Programming

XII. PLC Troubleshooting Techniques

INSTRUCTIONAL METHODS:

- Laboratory work
- Demonstrations
- Lecture - Discussion
- Reading assignments
- Homework
- Quizzes

INSTRUCTIONAL MATERIALS:

1. The student must meet the objectives of the course stated previously.

2. Laboratory reports must be completed as directed and receive an evaluation for accuracy of 70% or more using criteria set forth in the laboratory directions.

3. Grade for the course will be based upon the following:

Laboratory work	50%
Written tests and quizzes	30%
In Class Feedback	10%
Homework assignments	10%

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:

Programmable Logic Controls, Gates.

OTHER REFERENCES

Course Competency/Assessment Methods Matrix

ELE 1205; Programmable Logic Controllers II	**Assessment Options**																																
For each competency/outcome place an "X" below the method of assessment to be used.	**Assessment of Student Learning**	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Assignment
Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.	**Direct/ Indirect**	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D							
1.1 State why use PLC's at all.					x		x	x	x																		x					
1.2 Explain advantages to using.					x		x	x	x																		x					
1.3 Calculate monetary advantages to PLC use over Relay Logic.					x		x	x	x																		x					
1.4 Correctly Identify and state uses for each component of a PLC system.					x		x	x	x																		x					
1.5 Initialize a PLC.					x		x	x	x																		x					
2.1 Program a start stop jog.				x	x			x							x												x	x			x	
2.2 Program using a counter and comparators.				x	x			x							x												x	x			x	
2.3 Program a PLC timer application.				x	x			x							x												x	x			x	
2.4 Program a system to convert between decimal, octal, hex, binary and BCD numbers.				x	x			x							x												x	x			x	
3.1 Explain SQI, SQO and SQC instructions.				x	x			x	x						x												x	x			x	
3.2 State uses for each sequencer.				x	x			x	x						x												x	x			x	
3.3 Correctly use SQO instruction in a lab setting.				x	x			x	x						x												x	x			x	

3.4 Demonstrate the SQO to load timers and outputs in the same program.				x	x			x	x					x													x	x			x
3.5 Network to another PLC.				x	x			x	x					x													x	x			x
4.3 Define HMI terminals.				x	x	x								x													x	x			x
4.2 Connect HMI devices To the PLC.				x	x	x								x													x	x			x
4.1 Program HMI terminal for a PLC system.				x	x	x								x													x	x			x
5.1 Write prints for a PLC job.				x	x				x					x													x	x			x
5.2 Choose the correct wiring for the system.				x	x				x					x													x	x			x
5.3 Troubleshoot some common problems.				x	x				x					x													x	x			x
5.4 Develop a maintenance checklist.				x	x				x					x													x	x			x
5.5 Correctly enter and run/edit a program.				x	x				x					x													x	x			x
6.1 Correctly state in writing the process to be automated.				x	x	x					x			x																	x
6.2 Correctly use symbols to develop a wiring diagram.				x	x	x					x			x																	x
6.3 Write a documented program to perform the process.				x	x	x					x			x																	x
6.4 Write a user manual for the process.				x	x	x					x			x																	x