DATE: Summer 2014

CREDIT HOURS: 3.0

PREREQUISITE(S): ELE 1204

DELIVERY METHOD:
- Lecture: 2 Contact Hours (1 contact = 1 credit hour)
- Lab: 2 Contact Hours (2 contact = 1 credit hour)

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:

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:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory work</td>
<td>50%</td>
</tr>
<tr>
<td>Written tests and quizzes</td>
<td>30%</td>
</tr>
<tr>
<td>In Class Feedback</td>
<td>10%</td>
</tr>
<tr>
<td>Homework assignments</td>
<td>10%</td>
</tr>
</tbody>
</table>

STUDENT REQUIREMENTS AND METHODS OF EVALUATION:
Programmable Logic Controls, Gates.

OTHER REFERENCES
“This workforce solution was funded by a grant awarded by the U.S. Department of Labor’s Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warranties, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timelines, usefulness, adequacy, continued availability, or ownership. This solution is copyrighted by the institution that created it. Internal use, by an organization and/or personal use by an individual for non-commercial purposes, is permissible. All other uses require the prior authorization of the copyright holder.”
Course Competency/Assessment Methods Matrix

**ELE 1205; Programmable Logic Controllers II**

For each competency/outcome place an "X" below the method of assessment to be used.

<table>
<thead>
<tr>
<th>Assessment Measures – Are direct or indirect as indicated. List competencies/outcomes below.</th>
<th>Assessment Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct/Indirect</td>
<td>Article Review</td>
</tr>
<tr>
<td>1.3 Calculate monetary advantages to PLC use over Relay Logic.</td>
<td>D</td>
</tr>
<tr>
<td>1.4 Correctly Identify and state uses for each component of a PLC system.</td>
<td>D</td>
</tr>
<tr>
<td>1.5 Initialize a PLC.</td>
<td>D</td>
</tr>
<tr>
<td>2.3 Program a PLC timer application.</td>
<td>D</td>
</tr>
<tr>
<td>2.4 Program a system to convert between decimal, octal, hex, binary and BCD numbers.</td>
<td>D</td>
</tr>
<tr>
<td>3.2 State uses for each sequencer.</td>
<td>D</td>
</tr>
<tr>
<td>3.3 Correctly use SQO instruction in a lab setting.</td>
<td>D</td>
</tr>
<tr>
<td>Task</td>
<td>1</td>
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<tr>
<td>---------------------------------------------------------------------</td>
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</tr>
<tr>
<td>3.4 Demonstrate the SQO to load timers and outputs in the same program.</td>
<td>x</td>
</tr>
<tr>
<td>3.5 Network to another PLC.</td>
<td>x</td>
</tr>
<tr>
<td>4.3 Define HMI terminals.</td>
<td>x</td>
</tr>
<tr>
<td>4.2 Connect HMI devices To the PLC.</td>
<td>x</td>
</tr>
<tr>
<td>4.1 Program HMI terminal for a PLC system.</td>
<td>x</td>
</tr>
<tr>
<td>5.1 Write prints for a PLC job.</td>
<td>x</td>
</tr>
<tr>
<td>5.2 Choose the correct wiring for the system.</td>
<td>x</td>
</tr>
<tr>
<td>5.3 Troubleshoot some common problems.</td>
<td>x</td>
</tr>
<tr>
<td>5.4 Develop a maintenance checklist.</td>
<td>x</td>
</tr>
<tr>
<td>5.5 Correctly enter and run/edit a program.</td>
<td>x</td>
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<tr>
<td>6.1 Correctly state in writing the process to be automated.</td>
<td>x</td>
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<tr>
<td>6.2 Correctly use symbols to develop a wiring diagram.</td>
<td>x</td>
</tr>
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<td>6.3 Write a documented program to perform the process.</td>
<td>x</td>
</tr>
<tr>
<td>6.4 Write a user manual for the process.</td>
<td>x</td>
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