1. Catalog Description

a. **Course Number:** AET 3073

b. **Title:** Programmable Logic Controllers

c. **Meeting times and credit:** 2-2-3

d. **Term to be offered:** S

e. **Short Title:** PLCs

f. **Course Description:** Introduction to programmable logic controllers (PLCs) through its operation, programming, and uses in the control of production, manufacturing, industrial, and other processes.

g. **Prerequisite:** AET 2324 Electronic Control Systems

h. **Initial term of course offering:** Spring 2007

2. Student Learning Objectives and Evaluation

a. Student learning objectives of the course:

Students will:
- Identify the parts of and uses of programmable logic controllers (PLCs) in process control. (In-class activities, tests)
- Use the fundamentals of logic to describe ladder logic circuits and create ladder logic programs to solve process control problems using the PLCs programming instructions. (In-class activities, tests)
- Develop hands-on experience with programming and using the PLC through a series of laboratories. (Laboratories)
- Investigate how PLCs and data acquisition systems interact and how computer-controlled machines and processes such as CNC and robotics use PLC type controllers. (Group project)

b. Student assessment and grades

Student achievement will be assessed and grades will be given according to periodic in-class activities related to weekly readings, class attendance, class participation and other class related activities as well as a midterm exam and a final exam. Laboratory experience with PLCs will be emphasized throughout the
entire course. Students will complete a final group project with oral and/or written presentations illustrating student’s application of course information to a working control process using a PLC. Grades will be based upon the following distribution:

- In-class activities: 15%
- Hands-on laboratories: 30%
- Final group project: 25%
- Two tests – midterm and final: 30%

<table>
<thead>
<tr>
<th>OBJECTIVES</th>
<th>In-class activities</th>
<th>Hands-on laboratories</th>
<th>Final group project</th>
<th>Midterm and final exam</th>
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<tbody>
<tr>
<td>Identify the parts of and uses of programmable logic controllers (PLCs) in process control.</td>
<td>X</td>
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<tr>
<td>Use the fundamentals of logic to describe ladder logic circuits and create ladder logic programs to solve process control problems using the PLCs programming instructions.</td>
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<td>X</td>
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3. Outline of the Course

a) Introduction of and use of PLCs in industry. Hardware components. 1
b) Number Systems and Logic, Basic PLC Programming in ladder diagrams. Lab activities 2
   c) Timers, Counters, Advanced PLC Programming Instructions. Lab activities and midterm exam 6
4. Rationale

a. Purpose and Need:
Over the past 4 to 5 years, assessment of data from the National Association of Industrial Technology (NAIT) conference proceedings indicates that the Industrial Technology field including Automation and Control has changed significantly. The use of various computer technologies such as the programmable logic controller, integration of software such as human machine interface (HMI) and industrial transactions (database) into industrial processes, and the development of industrial Ethernet networking among other technologies have changed the field significantly. Students that graduate from the EIU Applied Engineering & Technology program need exposure and experience with these technologies. This course is to satisfy the PLC part of the need.

b. Justification of the level of the course and of course prerequisites:
PLCs are electrical and electronic in nature and use other electrical and electronic devices such as sensors, switches, lights, motors, etc. A background in electronics and electricity is needed. AET 2324 Electronic Control Systems provides this prerequisite background. Since PLCs are fundamental to automation and control, a junior level course following the introductory AET 2324 Electronic Control Systems courses means that students will be able to use the PLCs concepts in the other courses that make up the Automation and Control Concentration in the Applied Engineering & Technology degree program. The level of the course is such that with class experience in logic and basic electrical and electronic concepts from the prerequisite, students will have little difficulty learning and applying the PLC information.

c. Similarity to existing courses:
This course is not similar to any existing course.

d. Impact on program:
This course will become a central part of the Automation and Control concentration in the Applied Engineering & Technology degree program. See attached proposal to change the Automation and Control concentration.

5. Implementation

a. Faculty member(s) to whom the course may be assigned:
Dr. Sam Guccione, Dr. Rigoberto Chinchilla, Mr. James McKirahan

b. Specification of any additional costs to students:
Lab Fee $20
c. Texts:

6. Community College Transfer
A community college course may be accepted as a substitute; however upper division credit will not be awarded.

7. Date approved by School of Technology Curriculum Committee: October 6, 2005.

8. Date approved by LCBASCC: January 20, 2006

9. Date approved by CAA: February 2, 2006

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