Modesto Junior College  
Course Outline of Record  
**CMPET 232**

I. **OVERVIEW**  
The following information will appear in the 2009 - 2010 catalog

**CMPET 232 Introduction to Programmable Logic Controllers**  
2 Units

*Also offered as:* ELTEC - 232: Introduction to Programmable Logic  
*Formerly listed as:* CMPET - 232: Introduction to Programmable Logic

Introduction to the basic concepts of Programmable Logic Controllers. Installation, programming, maintaining, and trouble shooting of micro-sized programmable logic controller systems. Field trips are not required. Course is applicable to the associate degree.

II. **LEARNING CONTEXT**  
Given the following learning context, the student who satisfactorily completes this course should be able to achieve the goals specified in Section III, Desired Learning:

A. **COURSE CONTENT**

1. **Required Content:**
   a. Hardware and components
   b. Number systems and codes
   c. Fundamentals of controller programming logic
   d. Programmable Logic Controller programming
   e. Wiring diagrams and ladder programs
   f. Programming timers and counters
   g. Program control instructions
   h. Data manipulation and math instructions
   i. Fault diagnosis and correction
   j. Transducer operation and signal conditioning
   k. Controller system design
   l. System installation, maintenance, and operation

2. **Required Lab Content:**
   a. Hardware and components
   b. Number systems and codes
   c. Programmable Logic Controller programming
d. Programming timers and counters

e. Program control instructions

f. Data manipulation and math instructions

g. Fault diagnosis and correction

h. Transducer operation and signal conditioning

i. System installation, maintenance, and operation

B. **HOURS AND UNITS**

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<td>Lab</td>
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C. **METHODS OF INSTRUCTION (TYPICAL)**

Instructors of the course might conduct the course using the following method:

1. Classroom Lecture Presentations
2. Introduction and review of relevant technical manuals
3. Laboratory Demonstrations
4. Guest Speakers
5. Field Trips to Industry Sites
6. Individual student assistance via instructor rotating from station to station during lab period

D. **ASSIGNMENTS (TYPICAL)**

1. **EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS**

   *Time spent on coursework in addition to hours of instruction (lecture hours)*

   a. Weekly Chapter Reading Assignments

   b. Assigned reading of technical manuals

   c. Student out of class time reading, reviewing and preparing for lab assignments.

2. **EVIDENCE OF CRITICAL THINKING**

   *Assignments require the appropriate level of critical thinking*

   Typical Exam Question:

   1. Using time and counter instructions, write a program that will increment a counter every minute. After the counter reaches a value of 30 minutes, turn on Output 011. Input 102 will reset the counter.

   Typical Activity During Lab Work:
1. Each student is required to provide written responses to basic and comprehensive problems associated with the course content
2. Each student is required to write, troubleshoot and test controller programs that demonstrate principles related to the course topics
3. Each student is required to provide a written assessment of the completed laboratory work and must interpret the results obtained
4. Students demonstrate mastery of topic by utilizing instrumentation to diagnose proper operation of completed laboratory exercises.

E. TEXTS AND OTHER READINGS (TYPICAL)


III. DESIRED LEARNING

A. COURSE GOAL

As a result of satisfactory completion of this course, the student should be prepared to:

(1) to identify from schematics and properly use common PLC logic devices such as contacts, timers, (2) and counters write and demonstrate a simple PLC program to accomplish a given logic task.

B. STUDENT LEARNING GOALS

Mastery of the following learning goals will enable the student to achieve the overall course goal.

1. Required Learning Goals

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

   a. Identify and describe the basic hardware for microsized Programmable Logic Controllers
   b. Explain binary concepts and Boolean algebra used in Programmable Logic Controllers
   c. Identify the basics of Programmable Logic Controller programming and be able to write Ladder Programs using both a hand-held programmer and a dedicated personal computer
   d. Identify the use of and be able to apply programming timers, counters, control instructions, and sequencer instructions in developing a useful Programmable Logic Controller program
   e. Describe the basic design and operation of transducers used in conjunction with Programmable Logic Controllers and be able to identify signal conditioning necessary for such transducers
   f. Design and install a micro-sized Programmable Logic Controller system including input and output devices

2. Lab Learning Goals

   Upon satisfactory completion of the lab portion of this course, the student will be able to:

   a. Apply number systems and codes used in Programmable Logic Controllers
   b. Demonstrate methods for proper installation and maintenance of Programmable Logic Controllers
   c. Logically investigate and determine the location of faults in Programmable Logic Controllers and be able to identify signal conditioning necessary for such transducers
   d. Design and install a micro-sized Programmable Logic Controller system including input and output devices
IV. METHODS OF ASSESSMENT (TYPICAL)

A. FORMATIVE ASSESSMENT

1. Classroom programming and logic assignments
2. Lab unit quizzes.
3. Student quality of work and ability to work efficiently during labs.

B. SUMMATIVE ASSESSMENT

1. Mid Term and Final Exams.
2. Written documentation and evaluation of results during laboratory exercises.