FORM VERSION: 5/95
DATE REVISED: 8/98

PALOMAR COLLEGE
COURSE OUTLINE OF RECORD FOR
DEGREE CREDIT COURSE

__X__ Transfer course __X__ A.A. degree applicable course

(check all that apply)

COURSE NUMBER AND TITLE: AP E 110 Programmable Logic Controllers

UNIT VALUE: 4

MINIMUM NUMBER OF SEMESTER HOURS: 96

BASIC SKILLS REQUIREMENTS:

Appropriate language and computational skills.

ENTRANCE REQUIREMENTS

PREREQUISITE: Apprenticeship Electrician 109

COREQUISITE: None.

RECOMMENDED PREPARATION: None.

SCOPE OF COURSE:

Introduction to basic input/output hardware, processors and memory numbering systems associated with programmable controllers. Instruction includes use of personal computer to create and modify ladder diagrams and relay instructions, using solid state logic elements, counters, and shift registers. Principles of process control are explained and principle components are identified.

SPECIFIC COURSE OBJECTIVES:

The student will be able to:

1. Boot up PCs, load, and perform basic computer tasks.

2. Identify the various hardware components and explain their related functions in the operation of Programmable Logic Controllers.

3. Contrast the operation of solid state logic as compared to relay logic.

4. Employ timers, up-down counters and logic elements to create programming schemes for drill, lathe, and conveyer equipment operation.

5. Create a variety of operating schemes, load the programs into PLCs, and check and debug the programs to meet design operating criteria.

6. Demonstrate troubleshooting techniques designed to isolate trouble with the control system or the system under control.

CONTENT IN TERMS OF SPECIFIC BODY OF KNOWLEDGE:

I. Programmable Control
   - A. Basic I/O Hardware
   - B. Processors and Memory
   - C. Numbering Systems and Memory
   - D. Ladder Diagrams and Relay Type Instructions
   - E. Programming Devices
   - F. Small Programmable Controllers
   - G. Latching and Master Control Relays
   - H. Programming Timers
   - I. Programming Counters
   - J. Data Manipulation and Arithmetic
   - K. Shift Registers and Sequencers
   - L. Start-up and Troubleshooting

II. Principles of Process Control
   - A. Process Time Lags
   - B. Proportional Control Action

REQUIRED READING:

Code Calculations. Upper Marlboro, MD: National Joint Apprenticeship and Training Committee, 1996.

Fifth Year Student Workbook. Upper Marlboro, MD: National Joint Apprenticeship and Training Committee, 1993.

Fundamentals of Instrumentation. Upper Marlboro, MD: National Joint Apprenticeship and Training Committee, 1996.

National Electrical Code. Quincy, Mass: National Fire Protection Association, 1996.

Technicians Guide to Programmable Controllers. Upper Marlboro, MD: National Joint Apprenticeship and Training Committee, 1996.

SUGGESTED READING:

Electrical Contractor. Bethesda, MD: National Electrical Contractors Association.

REQUIRED WRITING:

Completion of written assignments in student workbook consisting of thirty to fifty pages in length.

OUTSIDE ASSIGNMENTS:

Students are expected to spend a minimum of three hours per unit per week in class and on outside assignments, prorated for short term classes.

Reading assignments from textbook. Researching company's programmable control systems, high voltage systems, telephone systems, and cable, and applying classroom and laboratory skills to practical job practices.

INSTRUCTIONAL METHODOLOGY:

Check all that apply:
__X__ lecture
__X__ laboratory
_____ lecture-laboratory combination
_____ directed study

This course may be offered as a distance education course and meets Title 5 regulations 55370, 55372, 55374, 55376, 55378, and 55380. Yes _____ No __X__

If yes, check all that apply. (See guidelines for preparation for definitions.)
_____ telecourse
_____ mediated instruction
_____ computer assisted instruction

GRADING POLICY AND STANDARDS (include methods of determining whether the stated objectives have been met by students):

5%	Workbook	A = 100 - 90
10%	Participation	B = 89 - 83
70%	Unit exams	C = 82 - 75
15%	Final exam	F = 74 and below

IS COURSE REPEATABLE FOR REASON(S) OTHER THAN DEFICIENT GRADE?
Yes __X__ No _____ Number of times course may be taken for credit: __2__

If yes, identify specific provision of Title 5 Division 2 section(s) 55761-55763 and 58161 which qualifies course as repeatable: 58161 Part C 2A

CONTACT PERSON: Director, Vocational Programs, Ext. 2286