SYLLABUS

DATE OF LAST REVIEW: 02/2013
CIP CODE: 46.0302
SEMESTER: Departmental Syllabus
COURSE TITLE: Programmable Controllers
COURSE NUMBER: ELET0255
CREDIT HOURS: 2
INSTRUCTOR: Departmental Syllabus
OFFICE LOCATION: Departmental Syllabus
OFFICE HOURS: Departmental Syllabus
TELEPHONE: Departmental Syllabus
EMAIL: KCKCC issued email accounts are the official means for electronically communicating with our students.

PREREQUISITE (S): None

REQUIRED TEXT AND MATERIALS: Please check with the KCKCC TEC bookstore, http://www.kckccbookstore.com, for the required texts for your particular class.

COURSE DESCRIPTION: This is an introductory course in programmable logic controllers. The course is designed for individuals without extensive electrical or controller backgrounds. Hardware aspects and programming aspects of controller operation are covered. The foundational controller logic symbols and controller logic operations necessary to interpret and write ladder logic programs are taught in this class. Students will enter, edit and test controller programs through assigned laboratory projects.

METHOD OF INSTRUCTION: A variety of instructional methods may be used depending on content area. These may include but are not limited to lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations,
speeches, debates, and panels, conferencing, performances, and learning experiences outside the classroom. Methodology will be selected to best meet student needs.

**COURSE OUTLINE:**

I. **Explain Basics Of:**
   A. Background/history
   B. Purpose of programmable controller
   C. Relay logic versus ladder logic
   D. Definition of a controller
   E. Components of a programmable controller

II. **Describe and Program Controller Hardware, Including:**
   A. Input/output modules
      1. Field wiring interface
      2. Rack configurations
      3. Solid state relay switching
      4. Troubleshooting
      5. Indicator lamps
      6. Terminal numbering
   B. Central processor
      1. Fixed memory (ROM)
      2. Alterable memory (RAM)
      3. Battery back-up
      4. Memory capability
      5. Indicator lights
      6. Function mode switch
   C. Power supply
      1. Rectification and filtering
      2. Power for CPU and I/O modules
      3. Back-up power
   D. Programming terminal
      1. Screen display
      2. Keyboard modes
      3. Cable connections

III. **Explain Controller Memory Organization**
    A. Fixed memory
    B. Alterable memory
    C. Data table
       1. Processor work areas
       2. Input image table
       3. Output image table
       4. Timers and counters
       5. Scratch pad areas
    D. User memory
       1. Program instructions
2. Controller scanning
E. Numbering systems in controller hardware
   1. Octal
   2. Binary
   3. BCD
F. Memory addresses
   1. Words
   2. Bits

EXPECTED LEARNER OUTCOME:
A. The student will be able to identify the hardware components of a programmable logic controller.
B. The student should be able to assemble the components of a programmable logic controller.
C. The student will be able to describe memory usage and I/O mapping of a PLC.
D. The student will be able to describe wiring of inputs and outputs to a PLC.
E. The student will be able to identify and use the numbering systems used in PLCs (binary, octal, hexadecimal, and decimal).
F. The student will be able to enter and test programs written in relay ladder logic into a PLC.
G. The student will be able to understand and describe relay logic and symbols used by PLCs.
H. The student will be able to incorporate and program timers and counters in PLC ladder programs.
I. The student will be able to perform arithmetic and logical operations with a PLC.

COURSE COMPETENCIES:

*The student will be able to identify the hardware components of a programmable logic controller.*

1. The student will be able to explain Central Processor Unit.
2. The student will be able to explain Microprocessor Unit.
3. The student will be able to explain Server Unit.
4. The student will be able to explain Input - Output cards.
5. The student will be able to explain monitor and keyboard.

*The student will be able to assemble the components of a programmable logic controller.*

6. The student will be able to install input and output switches.

*The student will be able to describe memory usage and I/O mapping of a PLC.*

7. The student will be able to explain binary messages.

*The student will be able to describe wiring of inputs and outputs to a PLC.*

8. The student will be able to explain inputs for motor controllers.
9. The student will be able to explain output for speed control.
The student will be able to identify and use the numbering systems used in PLCs (binary, octal, hexadecimal, and decimal).

10. The student will be able to decode binary codes.
11. The student will be able to decode octal codes.
12. The student will be able to decode hexadecimal codes.
13. The student will be able to decode decimal codes.

14. The student will be able to enter and test programs written in relay ladder logic into a PLC.

15. The student will be able to input code for testing.
16. The student will be able to check output code.

The student will be able to understand and describe relay logic and symbols used by PLCs.

16. The student will be able to explain sequence of relays.
17. The student will be able to explain function of symbols.

The student will be able to incorporate and program timers and counters in PLC ladder programs.

18. The student will be able to determine sequential timing.
19. The student will be able to install counters.

20. The student will be able to perform arithmetic and logical operations with a PLC.

ASSESSMENT OF LEARNER OUTCOMES:
Student progress is evaluated by means that include, but are not limited to, exams, written assignments, and class participation.

SPECIAL NOTES:

This syllabus is subject to change at the discretion of the instructor. Material included is intended to provide an outline of the course and rules that the instructor will adhere to in evaluating the student's progress. However, this syllabus is not intended to be a legal contract. Questions regarding the syllabus are welcome anytime.

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