COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Programmable Controllers
COURSE NUMBER	ELET 0255
DIVISION	Career and Technical Education
DEPARTMENT	ELET
CIP CODE	46.0302
CREDIT HOURS	2
CONTACT HOURS/WEEK	Class: 1 Lab: 2
PREREQUISITES	None

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.

PROGRAM ALIGNMENT
This course is part of a program aligned through the Kansas Board of Regents and Technical Education Authority. For more information, please visit:
https://kansasregents.org/workforce_development/program-alignment

PROGRAM LEARNING OUTCOMES

1. The Student will be able to identify workplace safety issues in accordance with OSHA standards.
2. Upon successful completion of this course, the student should be able to identify the job skills necessary to have a successful career in the Electrical Profession.
3. Inspect electrical circuit connections in accordance with the N.E.C. standards of compliance.

TEXTBOOKS
http://kckccbookstore.com/

METHOD OF INSTRUCTION

A variety of instructional methods may be used depending on content area. These include but are not limited to lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, 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
    A. Input/output modules
        i. Field wiring interface
        ii. Rack configurations
        iii. Solid state relay switching
        iv. Troubleshooting
        v. Indicator lamps
        vi. Terminal numbering
    B. Central processor
        i. Fixed memory (ROM)
        ii. Alterable memory (RAM)
        iii. Battery back-up
        iv. Memory capability
        v. Indicator lights
        vi. Function mode switch
    C. Power supply
        i. Rectification and filtering
        ii. Power for CPU and 1/0 modules
        iii. Back-up power
    D. Programming terminal
        i. Screen display
        ii. Keyboard modes
        iii. Cable connections

III. Explain Controller Memory Organization
    A. Fixed memory
    B. Alterable memory
    C. Data table
        i. Processor work areas
        ii. Input image table
        iii. Output image table

        iv.   Timers and counters
        v.   Scratch pad areas
IV.   User memory
        i.   Program instructions
        ii.   Controller scanning
V.   Numbering systems in controller hardware
        A.   Octal
        B.   Binary
        C.   BCD Control circuit schematic components
VI.   Memory addresses
        A.   Words
        B.   Bits

COURSE LEARNING OUTCOMES AND COMPETENCIES
Upon successful completion of this course, the student will:

A. Identify the hardware components of a programmable logic controller.
1. Explain central processor unit.
2. Explain microprocessor unit.
3. Explain server unit.
4. Explain input - output cards.
5. Explain monitor and keyboard.

B. Assemble the components of a programmable logic controller.
6. Install input and output switches.

C. Describe memory usage and I/O mapping of a PLC.
7. Explain binary messages.

D. Describe wiring of inputs and outputs to a PLC.
8. Explain inputs for motor controllers.
9. Explain output for speed control.

E. Identify and use the numbering systems used in PLCs (binary, octal, hexadecimal, and decimal).
10. Decode binary codes.
11. Decode octal codes.
12. Decode hexadecimal codes.
13. Decode decimal codes.

F. Enter and test programs written in relay ladder logic into a PLC.
14. Input code for testing.
15. Check output code.

G. Understand and describe relay logic and symbols used by PLCs.
    16. Explain sequence of relays.
    17. Explain function of symbols.

H. Incorporate and program timers and counters in PLC ladder programs.
    18. Determine sequential timing.
    19. Install counters.

I. Perform arithmetic and logical operations with a PLC.
    20. Explain math and logistical operation.

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES

Student Handbook
https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf

College Catalog
https://www.kckcc.edu/academics/catalog/index.html

College Policies and Statements
https://www.kckcc.edu/about/policies-statements/index.html

Accessibility and Accommodations
https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html.