SYLLABUS

LAST REVIEW   Fall 2022

COURSE TITLE   Programmable Controllers

COURSE NUMBER   BEMT 0255

DIVISION   Career and Technical Education

DEPARTMENT   BEMT

CIP CODE   46.0401

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 are necessary to interpret and write ladder logic programs are taught in this class. Students will enter, edit and test controller programs through assisted assigned laboratory projects.

PROGRAM LEARNING OUTCOMES

Students will demonstrate an adherence to safety standards and proficiency in the installation or repair of residential electrical, plumbing, HVAC, exterior building materials, roofing, irrigation systems, landscape/hardscape, concrete placement and finish, masonry install and repair.

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, Including:
   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
   D. User memory
      i. Program instructions
      ii. Controller scanning
   E. Numbering systems in controller hardware
      i. Octal
      ii. Binary

        iii.   BCD
   F.   Memory addresses
       i.   Words
       ii.   Bits

<mark>COURSE LEARNING OUTCOMES</mark>

Upon successful completion of this course, the student will:

A. Identify the hardware components of a programmable logic controller.
B. Assemble the components of a programmable logic controller.
C. Describe memory usage and I/O mapping of a PLC.
D. Describe wiring of inputs and outputs to a PLC.
E. Identify and use the numbering systems used in PLCs (binary, octal, hexadecimal, and decimal).
F. Enter and test programs written in relay ladder logic into a PLC.
G. Understand and describe relay logic and symbols used by PLCs.
H. Incorporate and program timers and counters in PLC ladder programs.
I. Perform arithmetic and logical operations with a PLC.

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.