

COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Advanced Programmable Logic Controllers (PLC)
COURSE NUMBER	AMFT 0221
DIVISION	Career and Technical Education
DEPARTMENT	AMFT
CIP CODE	15.0406
CREDIT HOURS	4
CONTACT HOURS/WEEK	Class: 1.5 Lab: 5
PREREQUISITES	AMFT 0121
COREQUISITES	None
COURSE PLACEMENT	None

COURSE DESCRIPTION

This class will involve an introduction to networking and communications, complex programming instructions, coordinating control with different control systems and different programming methodologies. This course will require students design programs from specification and download to real world manufacturing equipment to test and troubleshoot for proper operation. Topics covered will include HMI (Human Machine Interface) coordinating control of PLC controlled equipment.

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 assess hazards, mitigate risk, and develop procedures and protocol to create a safe working environment.
2. Student will be able to collaborate with team members in developing a plan to maximize efficiency in a production facility.
3. The student will be able to evaluate implicit tasks and identify necessary resources to install and maintain industrial equipment.
4. Student will be able to troubleshoot and repair industrial equipment in the high stress environment of modern manufacturing.

TEXTBOOKS

<http://kckccbookstore.com/>

METHODS 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. Safety procedures within global networked system
- II. Complex instructions such as Timers, Counters, Comparative, Logical
- III. Staging equipment through disable/enable electrical handshake
- IV. Staging equipment through disable/enable networked handshake
- V. HMI (Human Machine Interface) interaction with PLC Systems
- VI. Database manipulation of PLC and Equipment
- VII. Analogue PLC Input/Output closed Loop Control
- VIII. Final Lab project from specification.

COURSE LEARNING OUTCOMES

Upon successful completion of this course, the student will:

- A. The student will be able to demonstrate the safety procedures when working with programmable logic controllers.
- B. The student will be able to utilize the Timer instructions to build complex applications.
- C. The student will be able to utilize the Counter instructions to build complex applications.
- D. The student will be able to utilize the Comparative instructions to build complex applications.
- E. The student will be able to use MOV instructions with and without Timer and Counter instructions to build complex applications.
- F. The student will be able to program analogue inputs to coordinate with analogue outputs for proportional control.
- G. The student will be able to program real world proportional control parameters to control speed of a Variable Frequency Drive.
- H. The student will be able to program a PID Loop and test in lab.
- I. The student will be able to create electrical handshakes to enable and disable machine processes separate from main PLC Processor.
- J. The student will be able to utilize networking principles to share data and enable and disable machine separate from main PLC
- K. The student will be able to build HMI application in software.

- L. The student will be able to program HMI touch screen to control real world industrial equipment in lab.
- M. The student will be able to utilize data from an external database to control PLC based equipment.
- N. The student will be able to learn principles of how global manufacturing databases such as SAP or ERP systems control Machine processes through PLC Design.
- O. The student will be able to design a complex project from specification and test on real world equipment.

ASSESSMENT OF COURSE LEARNING OUTCOMES

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>.