Moberly Area Community College  
Common Syllabus

EET214 Programmable Logic Controllers  
Current Term

Instructor:  
Office number:  
Office Hours:  
Response time: I typically respond to student emails within 24 hours, Monday through Friday.  
Contact information:  
Classroom number:  
Class days and time:  

Catalog Description:  EET214 Programmable Logic Controllers  
(2-2-3)  
In this lecture/lab course, participants will learn the basic concepts, capabilities, hardware and system architecture, ladder logic programming, editing, and troubleshooting of programmable logic controllers. Emphasis is on knowledge and skills required by industrial maintenance technicians in an industrial environment.

Prerequisite/Co-requisite:  
EET111 Electrical Motor Controls

Text(s):  
None

Other Required Materials:

Purpose of Course:  
Participants will learn the basic concepts, capabilities, hardware and systems architecture, ladder logic programming, editing and troubleshooting of PLC’s. Emphasis will be given to the knowledge and skills required by industrial maintenance technicians in an industrial environment.

Course Objectives:  
Upon completion of this course, participants should be able to:  
• Demonstrate a basic understanding of PLC use, applications, maintenance, troubleshooting and safety procedures used by maintenance technicians in industry.
• List basic hardware components of a PLC system and describe the function of each:
  o Power Supply
  o Processor Module and Memory Modules
  o Input/Output Modules
• Demonstrate a basic understanding of PLC wiring
  o Power Wiring
  o Safety Wiring
  o Input/Output Wiring
• Demonstrate a basic understanding of PLC programming:
  o Processor Memory Organization
  o Numbering Systems
  o Scan Sequence
  o Basic Instruction Types
Knowledge skill objectives will be achieved via lecture presentations, class discussion, homework, and evaluated by paper/pencil testing consisting of quizzes, mid-term, and final exam. Practical skills will be taught via demonstration, lab practice, lab projects and “hands-on” application of programming and troubleshooting techniques used in industry.

Course Content:
• PLC Overview
  o Defining PLCs
  o Historical overview
  o Principles of Operation
  o PLCs vs. alternate control systems
  o PLC software vs. electrical line diagrams
  o PLC Size and Application
• PLC Hardware Components
  o I/O fundamentals
  o I/O modules
  o The CPU
  o Memory design
  o Memory types
  o Programming devices
  o Recording and retrieving data
  o PLC types (pico/micro/PLRs/etc.)
• Number Systems and Codes
  o Decimal system
  o Binary system
  o Octal system
  o Hexadecimal system
  o BCD system
• Basics of PLC Programming
  o Processor memory organization
o Processor file
o Program files
o Data files
o Program scan
o Relay-type instructions
o Instruction addressing
o Branch instructions
o Internal relay instructions
o Examine On (XIC) and Examine Off (XIO) Instructions
o Entering the ladder diagram
o Modes of operation
• Developing Fundamental PLC Wiring Diagrams and Ladder Logic Programs
  o Converting relay ladder diagrams into PLC ladder programs
  o Writing a ladder logic program directly from a narrative description
• Programming Timers
  o Timer Instructions
  o On-Delay Timer
  o Off-Delay Timer
  o Retentive Timer
  o Reset Instruction as it Applies To Timers
• Programming Counters
  o Counter Instructions
  o Up-Counter
  o Down-Counter
  o Combination Up/Down Counter
  o Reset Instruction as it Applies To Counters
• RSLinx (communications)
  o Purpose
  o Configuration
  o Troubleshooting
• Useful RSLogix500 Software Functions
  o Searching, backup/restore, print options
  o Utilities and modifying program parameters
  o Forcing external I/O addresses

Connection with Career and Technical Education (CTE) Outcome Statement:
In compliance with MACC’s CTE outcomes, the student who successfully completes this course will be able to:
• Students will demonstrate effective written and oral communication skills
• Students will think critically while systematically assessing problems, identifying issues and implementing solutions.

ASSESSMENT OF STUDENT LEARNING
Grade Scale:
A = 90-100%
B = 80-89%
C = 70-79%
D = 60-69%
F = 59% and below

Assessment:
(State the way learning outcomes will be measured. They may be measured through, but not limited to, the following: objective and essay questions, papers, quizzes, oral presentations, class participation, small group work, and/or projects.)

Expected Study Time Commitments:
Students should expect to spend approximately 2 to 4 hours per week studying, reading, and working on assignments for each registered credit hour. For example, 6 to 12 study hours per week may be expected for a 3-credit hour class.

Description of Assignment(s)/Project(s):

INSTRUCTOR POLICIES

Tardiness:
per instructor’s policy

Make-up and late work:
per instructor’s policy

Extra-credit work:
per instructor’s policy

Schedule of Student Assignments/Activities:
(Instructors will identify a Student Assignment/Activities schedule. Instructors have the prerogative to construct the schedule by class periods, weeks, or an overview of topics to be covered.)

Other:
List any other instructor policies

COLLEGE POLICIES

Attendance:
Students are expected to attend all class sessions for which they are enrolled. The College reserves the right to drop or withdraw students from courses due to lack of attendance.
Students need to be aware that dropping/being dropped from a course and their last date of attendance in the course may impact their financial aid.

MACC faculty are required to track attendance and report lack of attendance. An instructor must complete the appropriate steps to drop a student within one week following the student’s violation of the attendance policy. Additionally, a student’s attendance rate will be calculated based upon the first day the academic session begins (not the student’s date of enrollment in the course). If a student does not attend a course as defined below, the student will be dropped as “Never Attended.”

**Term Length Drop Calculations**

<table>
<thead>
<tr>
<th>Term Length</th>
<th>Drop Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-week:</td>
<td>Any student who misses two (2) consecutive weeks of class will be dropped from the course by the instructor unless acceptable justification is provided by the student and the student still has the opportunity to be successful in the course.</td>
</tr>
<tr>
<td>8-week:</td>
<td>Any student who misses one (1) consecutive week of class will be dropped from the course by the instructor unless acceptable justification is provided by the student and the student still has the opportunity to be successful in the course.</td>
</tr>
<tr>
<td>4-week:</td>
<td>Any student who misses two (2) consecutive days of class will be dropped from the course by the instructor unless acceptable justification is provided by the student and the student still has the opportunity to be successful in the course.</td>
</tr>
<tr>
<td>Intersession:</td>
<td>Any student who misses one (1) day of class will be dropped from the course by the instructor unless acceptable justification is provided by the student and the student still has the opportunity to be successful in the course.</td>
</tr>
</tbody>
</table>

Acceptable justification may include, but is not limited to, family emergencies, illness or injury, college-approved co-curricular and extra-curricular activities, and religious holidays.

**Definition of Course Attendance**

<table>
<thead>
<tr>
<th>In Seat Course</th>
<th>Physically attending scheduled, face-to-face, class meetings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Course</td>
<td>Being present, via appropriate platform, for scheduled class meetings/activities</td>
</tr>
</tbody>
</table>
Hybrid Course
Physically attending scheduled, face-to-face, class meetings and active participation in the online portion of the course which may include any or all of the following:
- Completion of quizzes or exams during class meetings and online
- Submission of assignments during class meetings and online
- Participation in discussions during class meetings and online

Online Course
Active participation in an online course includes the following:
- Completion of quizzes or exams
- Submission of assignments
- Participation in threaded discussions

Simply logging into the Learning Management System (Canvas) and/or accessing the course and course related material does not constitute active participation for the online component of hybrid courses or for online courses. (Policy Handbook G.040)

Academic Dishonesty:
MACC board policy is as follows: “Academic dishonesty by students damages institutional credibility and unfairly jeopardizes honest students; therefore, it will not be tolerated in any form.” Forms of academic dishonesty include but are not limited to the following: violations of copyright law, plagiarism, fabrication, cheating, collusion, and other academic misconduct. Incidents of dishonesty regarding assignments, examinations, classroom/laboratory activities, and/or the submission of misleading or false information to the College will be treated seriously. The procedure for handling academic dishonesty is outlined in the Student Handbook (Policy Handbook G.020). In cases of alleged academic dishonesty, the burden of proof is on the student, not on the instructor.

Recording Class Sessions Using Zoom:
The privacy of students is a priority in live or virtual meetings. Recordings of lectures or class meetings that share student information constitute an educational record and are protected under FERPA. Instructors may share recordings within the course section where they were originally recorded and only with the students enrolled in the section. Documented consent from each student identified in the recording is required to distribute outside of the course where it was originally recorded, or student identity must be redacted.

Student Email:
MACC Mail is the official student email system at MACC. Official college communication is sent via this email system. Students are responsible for checking their MACC Mail account regularly. Students may also receive notifications and reminders from MACC through the online learning platform. However, students should remain aware that the online learning platform messaging system and MACC Mail (student email) system are two separate systems.
**ADA Statement:**
Students who have disabilities that qualify under the Americans with Disabilities Act may register for assistance through the Office of Access and ADA Services. Students are invited to contact the Access Office to confidentially discuss disability information, academic accommodations, appropriate documentation and procedures. For more information, please call either the Moberly office at (660) 263-4100 Ext. 11240 or the Columbia office at (573) 234-1067 Ext. 12120, or visit our web page at http://www.macc.edu/index.php/services/access-office.

**Title IX Statement:**
MACC maintains a strict policy prohibiting sexual misconduct in any form, including sexual harassment, sexual discrimination, and sexual violence. All MACC employees, including faculty members, are considered mandated reporters of sexual misconduct and as such are expected to contact the Title IX Coordinator when they become aware, in conversation or in writing, of an incident of sexual misconduct. For more information on this policy or to learn about support resources, please see http://www.macc.edu/sexual-misconduct-policy or contact Ms. Cheryl Lybarger, MACC's Title IX Coordinator, at 660-263-4110, ext. 11369 or CherylLybarger@macc.edu.