MIDWESTERN STATE UNIVERSITY

MCCOY SCHOOL OF ENGINEERING
SYLLABUS – FALL 2025

EENG 4163-101: PROGRAMMABLE LOGIC CONTROLS

COURSE INSTRUCTOR

Dr. Zeki Ilhan (zeki.ilhan@msutexas.edu)
Office: McCoy Hall 219E
Phone: (940) 397-4004

LECTURE & LAB SCHEDULE

Days	*Time*	*Location*
Monday		
Tuesday	12:30 – 02:20 pm	MY 136: Lecture
Tuesday	02:30 – 04:20 pm	MY 118: Lab
Wednesday		
Thursday		
Friday		

OFFICE HOURS

Days	*Time*	*Location*
Monday	01:00 pm – 02:00 pm	MY 219E
Monday	02:00 pm – 03:00 pm	MY 219E
Tuesday	11:00 am – 12:00 pm	MY 219E
Wednesday		
Thursday	11:00 am – 12:00 pm	MY 219E
Friday	11:00 am – 12:00 pm	MY 219E

CATALOG DESCRIPTION

This course focuses on Programmable Logic Controller (PLC) programming using both open-loop and closed-loop control strategies. Topics include PLC hardware components, fundamentals of ladder logic, programming using timers, counters, comparison blocks, and various other math functions as well as the development of Human Machine Interfaces (HMIs). The implementation of feedback control is also demonstrated in a motor control task using Variable Speed Drives (VSDs) and the built-in PID function. Topics will also cover the electrical and electronic principles underlying PLC operation, providing a strong foundation for applications in electrical engineering. Companion lab.

COURSE PRE-REQUISITES

EENG 3283 – Electrical Systems Design

REQUIRED TEXTBOOK

Programmable Logic Controllers by Frank Petruzella (6th Edition or 2025 Evergreen Release)
McGraw-Hill. (ISBN-13: 978-1264163342 or 978-1266016394)

LIST OF TOPICS COVERED*

- Overview of Programmable Logic Controllers
- Comparison of Hardwiring vs. PLC Logic
- Number Systems and Codes
- Fundamentals of Logic
- Timers, Counters, Math Functions, Comparisons
- Developing PLC Programs using Ladder Logic
- Developing Human Machine Interfaces (HMIs)
- Motor Controls and Variable Speed Drives
- Hands-on Programming: AB SLC 5/05
- Hands-on Programming: AB CompactLogix

**Additional material might be covered as the time permits.*

ATTENDANCE POLICY

Attendance is mandatory, and it represents a part of your overall grade. You are expected to attend ***both*** the lectures and the labs as they are highly intertwined in this class. Attendance will be checked regularly using the AttendMe App. Detailed instructions on how to download and use this app will be made available in the lectures.

GRADING SCHEME
The overall grade will be based on the scores earned on the midterm and final exams, weekly homework assignments, and attendance (both lectures and labs). The exams sum up to 70% of the total grade, homework scores sum up to an additional 20%, and the remaining 10% is the attendance. The contribution of each grade item to the overall score is provided in Table 1.

Table 1: Percentage contribution of each grade item to the overall grade.

Grade Item	**Contribution**
Midterm Exam	35%
Final Exam	35%
Homework	20%
Attendance	10%
TOTAL	**100%**

FINAL EXAM
TBA

DESIRE 2 LEARN (D2L) & BRIGHTSPACE PULSE
I will use the D2L platform for posting the syllabus, course communication, lecture notes, assignments, and grades. Mobile version of the D2L platform is the Brightspace Pulse App, which is available for free on iPhone, iPad, and Android devices. Consider downloading Pulse for instant notifications about the course.

STUDENT RESOURCES
For quick links to numerous offices and student services available on the MSU Campus, please refer to the MCOSME Student Resources Website

ACADEMIC MISCONDUCT POLICY & PROCEDURES
Academic Dishonesty: Cheating, collusion, and plagiarism (the act of using source material of other persons, either published or unpublished, without following the accepted techniques of crediting, or the submission for credit of work, not the individual to whom credit is given). Additional guidelines on procedures in these matters may be found in the Office of Student Conduct.

USE OF GENERATIVE AI
Students may use AI tools (e.g., ChatGPT) for brainstorming purposes, similar to how one might use a search engine like Google. However, generating assignments ***entirely*** through AI without meaningful personal input, revision, or understanding is ***not*** permitted and will be considered a form of plagiarism.

CONFLICT RESOLUTION PROCESS

1. In the event of an issue with the course or the instructor, the student should first contact the instructor. The faculty and the student will discuss the issue. Hopefully, a resolution is reached.
2. The student should notify the faculty via email again if the issue still did not get resolved after the first communication.
3. If not resolved, the student could then contact the Chair of the McCoy School of Engineering, Dr. Desai, face to face or via email, (raj.desai@msutexas.edu), and discuss the issue.
4. Dr. Desai will discuss the issue at hand with the faculty member. Dr. Desai will discuss the result of this discussion with the student. Hopefully, a resolution is reached on the issue after this step.
5. The student should notify the Chair via email if the issue still did not get resolved.
6. The Chair will contact the Dean and try to resolve the conflict. In case the conflict deals with the student grade, he will forward the case to the Grade Appeals Committee, if necessary.

COURSE ORGANIZATION AND ASSESMENT

- **Course Format:** This course includes a weekly 110-minute lecture and a 110-minute lab session. Lectures will primarily focus on the theoretical concepts, while lab sessions will feature hands-on demonstrations using PLC trainers. Due to time constraints, not all textbook material will be covered in lectures. Therefore, students are expected to follow the instructor's guidance and refer to the lecture notes on D2L to prepare for exams. You will ***not*** be responsible for textbook chapters or sections that are not covered in class.

- **General Study Guidelines:** It is highly recommended that you ***revisit*** the content before beginning any homework assignments. Plan to spend a few hours ***each week*** outside of class reviewing the material covered in ***both lectures and lab sessions.*** Avoid waiting until the last minute to prepare for exams. Make use of ***office hours*** throughout the semester if you need assistance with assignments or course material.

- **Student Attitude:** After the class starts, the use of phones, conducting private discussions, working on anything that is not directly related to the course, and making derogatory remarks about your classmates or instructor will not be accepted and may result in your dismissal from the class.

- **Midterm Progress Reports:** In order to help students keep track of their progress toward course objectives, the instructor will provide a Midterm Progress Report for at-risk students through their WebWorld account. Midterm grades will not be reported on the students' transcript; nor will they be calculated in the cumulative GPA. They simply give students an idea of where they stand at the midpoint of the semester. Students with a midterm grade below a C should talk to the professor and seek out tutoring.

- **Homework Evaluation Method:** Your performance will be tested regularly throughout the semester by homework assignments. While several homework problems may be assigned as part of a homework assignment, it may be the case that only a subset of problems will be graded. However, you must attempt all problems. ***Do not try to guess which problems will not be graded.***

- **Late Assignments:** Homework assignments must be submitted online in D2L Dropbox on the due date, at the due time. Late assignments will ***not*** be accepted. However, depending on the overall class progress, ***one (or two) of the lowest scored assignments may not be included in the final grade.***

- **Exam and Lab Make-ups:** Make-ups will be given only in case of an ***emergency*** (accompanied by a doctor's report) or a well-documented conflict due to a scheduled ***athletic event*** or a ***conference.***

- **Grade Appeals:** Grade appeals should be resolved with the instructor. If unresolved, they need a formal written appeal to the Dean of the College in which the course was taught. For more information about the grade appeals, consult the Grade Appeal Checklist through the MCOSME Student Resources website.

- **Academic Honesty Appeals:** Academic honesty appeals are reported to the Department Chair. For more information about the academic honesty appeals, consult the Academic Honesty Checklist through the MCOSME Student Resources website.

- **Disability Support Services:** In accordance with Section 504 of the Federal Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, Midwestern State University endeavors to make reasonable accommodations to ensure equal opportunity for qualified persons with disabilities to participate in all educational, social, and recreational programs and activities. If you have a documented disability that will impact your work in this class, please make an appointment through Disability Support Services located in the Clark Student Center, Room 168, (940) 397-4140.

- **Disclaimer Statement:** Information contained in this syllabus, other than grading policies, may be subject to change with advance notice, as deemed appropriate by the instructor.

COURSE OBEJCTIVES IN RELATIONSHIP TO ABET STUDENT OUTCOMES

Table 2: Course objectives matched with the ABET student outcomes (1-7)

COURSE OBJECVTIVES	1	2	3	4	5	6	7
Students will be able to compare hardwired relay logic with PLC ladder logic.	X	X				X	
Students will be able to become proficient in PLC programming using RSLogix 500® and RSLogix 5000® software.						X	
Students will be able to design logic for small PLC projects.		X			X		
Students will be able to design HMI screens for PLC projects using PanelBuilder32® and FactoryTalk View Studio® software.		X			X		
Students will be able to enter a program and operate a real PLC to a real application.	X	X			X	X	
Students will be able to design PLC logic for motor control using the Proportional-Integral-Derivative (PID) control block and a Variable Speed Drive (VSD).	X	X				X	
Students will be able to design safety in machines using good programming methods.				X			

Table 3: Detailed descriptions of the ABET student outcomes (1-7) listed in Table 2.

ABET OUTCOME	DESCRIPTION
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2	an ability to apply engineering design to produce solutions that meets specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3	an ability to communicate effectively with a range of audiences.
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6	an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Prepared by Zeki O. Ilhan, August 2025.