

SYLLABUS
MENG 4122 - 101 Machine Control Programming
(Required Course)
Fall 2023

Instructor: Dr. Brink

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Office Hours: M: 2-5 pm; W: 1.00 – 2.00 pm; F: 15.20 -4.30 pm

Course Schedule: Lecture: R: 12.30 – 1.20 pm; LAB A R: 1.30 – 3.20 pm; LAB B: R 3.30 -5.20 pm; LAB C: F: 1.30 - 3.20 pm

Location: MY 136 (for the Lecture) and LAB MY 118 or MY 139

CATALOG DESCRIPTION

PLC = Programmable Logic Controller Programming with an emphasis on motor control using variable speed drives. Companion lab.

COURSE PRE-REQUISITES

MENG 3203 Applied Fluid Power Design.

OTHER PREREQUISITES

Basic computer skills, MS Excel, hand calculator

REQUIRED TEXTBOOK

Programmable Logic Controllers by Frank D. Petruzela, Sixth Edition + Two different PLC Lab Manuals Fall 2022 (LAB Manuals will be provided free of charge on D2L)

REFERENCES

Additional material will be distributed in the form of handouts.

TOPICS COVERED

- Comparison of hardwired logic vs. PLC logic
- Some labs using Automation Studio software (If time permits)
- Actual hands on programming of AB SLC 5/05 @ Compact Logix PLCs
- Inputs, outputs, relays, timers, counters, math functions, comparison functions, PID
- HMI control
- Motor control and Variable Speed Drives

COURSE LEARNING OBJECTIVES AND RELATIONSHIP TO STUDENT OUTCOMES

Outcome-Related Course Learning Objectives	Program Outcomes						
	1	2	3	4	5	6	7
Compare hardwired relay logic to PLC logic	x	x				x	
Become proficient with the Automation Studio PLC and fluid power software						x	
Be able to design logic for small PLC projects		x			x		
Be able to enter a program and operate a real PLC to a real application	x	x			x	x	
Be able to design PLC logic for Motor Control, including PID	x	x				x	
Be able to design safety in machines using good programming methods				x			
1: an ability to identify, formulate, and solve complex engineering problems by applying the principles of engineering, science, and mathematics							
2: an ability to apply engineering design to produce solutions that meet 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 judgement to draw conclusions							
7: an ability to acquire and apply new knowledge as needed, using appropriate learning strategies							

CONTRIBUTION OF COURSE TO PROFESSIONAL COMPONENT Fall 2023 Dr. Brink
 This course contributes to the Engineering Science component of the program.

COURSE ORGANIZATION AND ASSESSMENT

- Lecture Format

I will explain the labs in the class room before a lab can be performed in order to understand the material. Class time will be spent mostly explaining and discussing concepts. Lectures will not be used to communicate the entire course content and thus, you will have to study some of the course material on your own. Student participation in class discussions is highly encouraged. You also be tested over all the lab material.

- Class Attendance

You are expected to attend class consistently and are responsible for notes, homework assignments, and exams missed while being absent. Labs and Lecture are highly intertwined in this class. Attendance of both lecture and lab is extremely important in order to be able to follow the class.

- Student Attitude

Once class starts, the use of cell phone and/or pager, reading a newspaper, conducting private discussions, using the computer (unless asked by your instructor), working on anything that is not directly related to the course, making derogatory remarks about a classmate or your instructor will not be accepted and may result in your dismissal from the class.

- Home works and Late Assignment

Homework assignments must be turned in on the due date, at the beginning of class. Once class starts, no homework will be accepted. Do not ask one of your classmates to turn in an assignment for you. It will not be accepted. Since writing, analytical, and critical thinking skills are part of the learning outcomes of this course, all writing, problem solving, and coding assignments should be prepared by the student. Developing strong competencies in this area will prepare you for a competitive workplace. Therefore, AI-generated submissions are not permitted and will be treated as plagiarism.

- Exam Make-up

You are expected to take the exam on the scheduled date and time it is given. However, if for some acceptable reason you are not able to do so, then you must inform the instructor in advance. **Some form of official proof has to be provided to the instructor for the absence.**

- Exam Content

The test material will come from the lectures and the labs and some design will be required on the creation of new computer programs.

- Evaluation Method

Your performance will be tested regularly throughout the semester by in-class exams, and several homework assignments. There will be only two exams. This includes the final exam. Homework assignments sets will be collected for grading, you are encouraged to submit each and every assignment. Homework will only be accepted at the beginning of class, since I do not want you to work on the homework during class.

- Course Grade

The final grade for the course will be based on the exam scores, the scores earned in the homework (Note; homework could be a lab) assignments, and the score received for your attitude/attendance. The overall average score (X) for the course is determined as follows:

$$X = 0.60 \times ((\text{exam1 score} + \text{exam 2 score})/2) + 0.20 \times (\text{homework average}) \\ + 0.20 \times (\text{attitude/participation/attendance score} - \text{lecture/lab}).$$

Note: The homework average counts for 20%. (Homework could be from the lab, book etc.).

Exam 1 and exam 2 count each for 30% of the grade. The final exam is exam 2.

The final letter grade for the course is based on the value of X and is determined from to the following grade levels:

Value of X (in %)	89.5 - 100	79.5 - <89.5	69.5 - <79.5	59.5 - <69.5	<59.5
Letter Grade	A	B	C	D	F

GENERAL GUIDELINES

Attend all classes and all labs. Participate and do all the work.

GENERAL EDUCATION STATEMENT

Students in this course must demonstrate their competency in oral and written communication through written homework assignments and exams, and through solving problems on the board. They must also demonstrate their ability to use the English language.

ACADEMIC INTEGRITY POLICY

Scholastic dishonesty will not be tolerated and will be prosecuted to the fullest extent. You are expected to have read and understood the current issue of the student handbook regarding student responsibilities & rights, and the intellectual property policy information about procedures and what constitutes acceptable on-campus behavior.

Disability:

Students with disability must be registered with Disability Support Services before classroom accommodations can be provided.

DISCLAIMER STATEMENT

Information contained in this syllabus, other than grading, late assignments, makeup work, and attendance policies, may be subject to change with advance notice, as deemed appropriate by the instructor.

Conflict Resolution

- a. The student should contact the instructor face to face or via e-mail if there is an issue with the course or the instructor. The faculty and the student will discuss this face to face or via email. Hopefully a resolution is reached on the issue.
- b. The student should notify the faculty via email again if the issue still did not get resolved after the first encounter or communication.
- c. The student can then contact the Chair of the McCoy School of Engineering, Dr. Desai, face to face or via email, (raj.desai@msutexas.edu), and discuss this issue. 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.
- d. The student should notify the Chair via email if the issue still did not get resolved.
- e. The Chair will contact the Dean and try to resolve the conflict. In case the conflict deals with the student grade, she will forward the case to the Grade Appeals Committee if necessary.

Final Exam:

Will be on Thursday, Dec 14 2023, 1.00 - 3.00 pm