

Georgia Southern University
Allen E. Paulson College of Engineering and Information Technology
Department of Mechanical Engineering

MENG 5335(G) Introduction to Programmable Logic Controllers

Spring Semester, 2024

SCHEDULE: M&W: 9:05-9:55 (Eng 2120)
F: 12:20-2:00 (Eng 2120)

INSTRUCTOR: Dr. JungHun Choi
Eng. Bldg. Room 2131
Phone: 912-478-4123
E-mail: jchoi@georgiasouthern.edu

Office Hours: M 10am-12:00pm or by appointment

TEXT: *Programmable Logic Controllers, 6th edition, Frank D. Petruzella (New York: McGraw-Hill, 2023)*

Lab Manual: *LOGICPRO PLC LAB MANUAL FOR USE WITH Programmable Logic Controllers, 6th edition, Frank D. Petruzella (New York: McGraw-Hill, 2023)*

DESCRIPTION: The programmable logic controllers (PLC), its components and operation, common methods of programming the PLC, and its applications in industry will be studied. The course also studies associated hardware which include sensors, and actuators to further student's background and skills in PLC.

PRE-REQUISITE: **EMENG3531 (Make sure you satisfy pre-requisite, otherwise you will be administratively withdrawn from this course).**

LEARNING OUTCOMES:

Upon successful completion of the course, the students will be able to:

- Understand the process and modern tools of data acquisition using PLC as a platform.
- Analyze, interpret, and report experimental data.
- Apply analog signal processing and digital circuits in industrial systems.

Relationship of course to student outcomes: This course contributes to satisfying the following ME Program Outcomes:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics(ABET criterion 1)
2. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions(ABET criterion 6)
3. an ability to use the techniques, skills, and modern engineering tools as required in the solution of applied engineering problems(ABET criterion 8)

COURSE TOPICS:

1. Programmable Logic Controllers (PLCs): An Overview
 2. PLC Hardware Components
 3. Number Systems and Codes
 4. Fundamentals of Logic
 5. Basics of PLC Programming
 6. Developing Fundamental PLC Wiring Diagrams and Ladder Logic Programs
 7. Programming Timers
 8. Programming Counters
 9. Program Control Instructions
 10. Data Manipulation Instructions
 11. Math Instruction
 12. Sequencer and Shift Register Instructions
- * Extra exam and/or project will be given to the graduate course.

GRADING POLICY:	Quizzes (4 × 2.5%)	10%
	Midterm Exam (2× 15%)	30%
	Labs	30%
	HomeWorks	10%
	Final Exam	20%

Letter grades are typically assigned with respect to total percentages earned based upon the standard university policy described in the catalog (100% – 90%: A, 80% - 89%: B, 70% - 79%: C, 60% - 69%: D, <60%: F).

EXAMINATIONS: There will be **four quizzes** spread over the semester and **two mid-term exam**. The comprehensive **final exam** will be during the final exam period. **There will be no make up quizzes/mid-term exam or final exam** unless in extraordinary cases (e.g. medical emergency etc.).

LAB REPORTS: The lab report should document the results of the lab and demonstrate the deliverables in a concise and organized manner. The lab report should include analysis of the results and the deviation (if any) between the experimental and the expected values. Lab report is to be handed in at the **beginning of class** on the day of the next Lab. **No late report will be accepted.**

STUDENT OBLIGATION: Students are required to be in class before the normal class starting time. A student will be marked 'tardy' if not in class within 5 minutes of the class starting time. A student will be marked 'absent' if not in class within 10 minutes of class starting time. Each two 'tardy' instances will be considered as an absence. There is a minimum attendance requirement (90% of the total class hours) for this course. Un-excused absences from labs/quizzes/tests/final exam and failure to attend required number of classes may result in failing grades. It is students' responsibility to keep abreast of class procedural announcements. The course materials and the changes (if any) in schedule for quizzes/tests will also be posted regularly in Folio. Cell phones and mobile devices will not be allowed for

texting/communication in the class.

ATTENDANCE POLICY: Attendance will be taken regularly. Each five absences in lecture and lab classes combined will cause a letter grade drop in the final grade. Below 80% attendance will fail the course and F grade will be given.

ACADEMIC HONESTY: The highest level of academic honesty is expected of all GSU students. While cooperation is encouraged on course material learning, unique and individual efforts must be demonstrated for evaluation. Individual efforts on quizzes/tests/labs and the final exam are demanded.

Policy on Academic Honesty and In-Class Use of Electronic Devices

Academic Dishonesty: Any student suspected of being involved in any act of cheating or plagiarizing will receive an "F" for the assignment, test or activity in question. At the discretion of the course instructor, they will also be referred to the dean of students for any further appropriate disciplinary actions.

**Georgia Southern University Campus Pledge: On my honor, I will be academically honest in all of my course work and will not tolerate the academic dishonesty of others. I also pledge to engage in ethical behavior on-campus and off-campus, to live an honorable lifestyle, and to create a campus environment that is characterized by individual responsibility, civility, and integrity."*

*Academic dishonesty includes but is not exclusively represented by:

- Submitting material that is not yours as part of your course performance;
- Using information or devices that are not allowed by the faculty;
- Obtaining and/or using unauthorized materials;
- Fabricating information, research, and/or results;
- Violating procedures prescribed to protect the integrity of an assignment, test, or other evaluation;
- Collaborating with others on assignments without the faculty's consent;
- Cooperating with and/or helping/allowing another student to cheat;
- Demonstrating any other forms of dishonest behavior.

* Plagiarism includes but is not exclusively limited to:

- Directly quoting the words of others without using quotation marks or indented format to identify them;
- Using sources of information (published or unpublished) without identifying them;
- Paraphrasing materials or ideas without identifying the source;
- Unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic material.

* All course assignments are individual assignments, unless otherwise stated by your instructor. This applies to term papers, homework, drawings, projects, tests, quizzes, exams, and any other assignments to be graded. Proof reading and editing papers and presentations for grammar is permitted. No student shall receive, offer or give assistance not authorized by the instructor in the preparation of any assignment. Attendance will be taken regularly. Each five absences in lecture and lab classes combined will cause a letter grade drop in the final grade.

Policy Concerning In-Class Use of Electronic Devices: Cellular telephones, pagers, or other electronic devices must be turned 'off' during class sessions. Text messaging or other communication during class and examinations is prohibited. In the event you are expecting an emergent communication, with prior approval from the professor you may place the device in silent-mode and excuse yourself from class when the call is received. Failure to comply with this policy will result in confiscation of the electronic device for 24-hrs. Any devices that can communicate with other devices, persons, or the access of information (stored or real-time) are not permitted during exams, quizzes, etc.