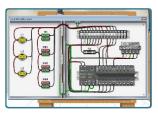**The University of Texas at Tyler**
Soules College of Business
Department of Technology

TECH 2319 – PROGRAMMABLE LOGIC CONTROLLERS

Course Syllabus

Course: TECH 2319
Title: Programmable Logic Controllers
Section: 001
Pre-requisite: None
Semester: Spring 2025
Class Time: Wed 6:00 pm-8:45 pm
Class Locations: Soules COB 160

Instructor: Mohammed Ali, PhD, MBA, CSMS
Office: UT Tyler-KC Longview, LH 230C
Phone: (903) 236-2040
Email: mohammedali@uttyler.edu
Preferred Method of Contact: email
Office Hours: MW 2:00 p.m. -5:00 p.m.
and by appointment

Course Description:

Introduction to programmable logic controller logic circuits, inputs and outputs, power supplies, data sheets, safety programming, types of processors and memory organization, PLC architecture, ladder logic, and task-oriented programming methods.

Lecture Notes and Classroom Environment:

The lecture notes for the course will be available online on the Canvas site. Additionally, students are required to take notes during face-to-face classes (if necessary and take place) on supplemental lecture materials, problem-solving, and diagrams that the instructor writes/draws on the classroom board. A student is **NOT allowed** to take photos of notes on the board.

Textbook (Required)

Max Rabiee (2021). Programmable Logic Controllers: Hardware and Programming (5th ed.). Tinley Park, IL: Goodheart-Willcox. ISBN: 978-1649259868.

Course Objectives:

Upon successful completion of this course, participants will be able to:
1. Describe PLC components, controllers, and fixed and modular devices.
2. Connect sensors and switches to PLC ports.
3. Perform binary math operations and conversion between binary and decimal numbers.
4. Identify electrical symbols, motor controls, and overload relays.
5. Create relay logic circuits for process and industrial control problems.
6. Create PLC ladder logic diagrams, test, print, and save them.
7. Understand various timers, counters, fault, and interrupt systems.
8. Write a report and present the results.

Student Learning Outcomes:

1. Describe the benefits of PLCs over electromechanical relay logic systems by successfully passing quizzes and exams with a 70% or better.

2. Distinguish between fixed and modular PLC devices, input or output modules for Festo LabVolt PLC Trainer by successfully passing quizzes and exams with a 70% or better.
3. Create PLC ladder logic programs for operation and monitoring relay logic, timer, counter, comparison, move, and sequencer instructions by successfully completing lab exercises and passing quizzes and exams with a 70% or better.

Core Competencies

1. Computer-Based Skills – the student will complete written assignments using the word processor.
2. Communication Skills – the student will exhibit a mastery of both written and oral skills in completing and presenting the assigned projects.
3. Interpersonal Skills – the student will interact in class discussions to clarify thinking regarding technological progress.
4. Problem Solving (Critical Thinking) – the student will use conceptual thinking to analyze and make determinations regarding the use of industrial processing equipment.
5. Ethical Issues in Decision-Making and Behavior- The student will gain an appreciation of the ethics of technology through the examination of various processes.
6. Personal Accountability for Achievement – the student will complete the projects at the time designated by the instructor and will enter into class discussion.
7. Competence in Technology Principles
   a. Competence in major field and grounding in other major technology core areas – the student will gain an appreciation of the benefits and problems of technological growth.
   b. Exposure to and appreciation for industrial experiences such as industrial tours, work-study options, cooperative education, and senior seminars – Optional plant tours will be offered.

Grading Policy and Criteria to Determine Final Course Grade:
Grading components are assigned weights*

Attendance	100
Chapter Quizzes	300
Lab Exercises	400
Midterm exam	100
Final Exam	100
TOTAL POINTS =	1000

*NOTE: This is NOT set in stone, pending the number of quizzes and lab exercises given.

Grade Scale Breakdown:

A=90 - 100%
B=80 - 89%
C=70 - 79%
D=60 - 69%
F=BELOW 60%

Course Policies:

Attendance:

Attendance will be mandatory at every scheduled class and laboratory period. No make-ups unless:
1. Organized university trip.
2. Illness or death in the immediate family (mother, father, brother, and sister).
3. Illness of student.

Each of these will require either a **doctor's statement** or a **signed statement** from the individual in charge of the trip.

A student will lose a letter grade in the course each time s/he is absent or late three times. Any student entering the classroom 1 second after the scheduled starting time will be considered delinquent.

Talking:

While the instructor is talking (in a face-to-face class), it is understood that no one should be talking. Students talking in class prevent other students from hearing the instructor and learning the required material to pass the course. If you are caught talking, you will earn a zero on your daily quiz grade. On the second offense, you will be **asked to leave**. This behavior is rude and disruptive, and most students who speak in class typically earn lower grades. It should be noted that students who have been granted permission to talk by the instructor should not be interrupted as well. If a student does not like to listen to the lecture or any personal issue arises, they can leave the classroom gently but are NOT allowed to disturb or distract their classmates. Please respect your classmates who have paid for this course and want to listen to the lecture and learn the content.

Chapter Quizzes and Exams:

Chapter lectures will follow up with online quizzes. Exam content will be taken from lectures, demonstrations, quizzes, reading and writing assignments, laboratory exercises (if any), and audio-visual materials, i.e., films, tapes, slides, etc. **Cell phones, laptops, iPads, or other electronic communication equipment besides a calculator are not allowed during the exam.** The first violation will receive a warning, and the second violation will result in a fine, forfeiting their right to take the exam.

Make-up quizzes and examinations are the student's responsibility. **No excuses will be accepted after the due date has passed**. The instructor must be notified **before** the scheduled exam. If not, the student forfeits their right to take the exam. However, make-up exams will be on a different set of questions. *Quizzes and assignments will not be made up unless the instructor has received a prior acceptable excuse for an absence.*

Late Work:

All work **not turned in on time will automatically reduce the value to 50% of its full value.** Exceptions to this will be as per University Policy concerning absences from class. The student must take the quiz and submit the assignment by the due date or the date administered. **The instructor is NOT responsible for reminding students about missed quizzes, assignments, or exams.** If you know a quiz/assignment/exam will be late for a valid reason, inform your instructor to avoid unnecessary penalties.

Format for Lab Exercise Assignment Reports:

Each assignment must be written so the reader can quickly examine the contents. Materials that are hard to read or require special handling will not be graded. The cover page must contain the following:

1. Assignment Title and Chapter Number bolded
2. Your Name: Prepared by Joe Student
3. Your University I.D Number
4. Course Name and Number
5. The Date

6. Submitted to Dr. Mohammed Ali

Your grade will reflect the quality of the presentation/paper.

Cell Phones:

Cell phones are to be seen and not heard. Please turn off your cell phone during class or turn it into vibrator mode. A ringing cell phone is a distraction and is inappropriate for the classroom. Allowing your cell phone to ring and then answering it is very rude. It is not fair to your classmates who have paid for this course. **Please be considerate and ensure your cell phone is turned off during class. Students will be asked to leave for the day if this behavior continues.**

Additional Course Management and Classroom Policies:

1. No retakes of quizzes or exams for "technical difficulties or internet interruptions." Get reliable technology or use the campus resources with Ethernet cabling, NOT Wi-Fi.

2. No excuses to leave the country and miss final exams or final presentations in class. A zero for these and any other assignments will be given.

3. No telephone usage in the classroom - texting, talking, social media...... You will be asked to leave the classroom and counted as absent for the day and NOT allowed to make up any assignments, quizzes, etc.

4. Talking during class while the professor is talking, a guest speaker or student presentations will be penalized. There will be no class participation points, up to 25% of the overall score.

5. If a student is more than 5 minutes late without an excuse, it counts as an absence. Three absences is an automatic reduction of a letter grade in the class.

Tentative Schedule

WEEK 1: Jan 13 – Jan 18, 2025
        Course syllabus descriptions, class policies, and discussion
        Chapter 1: Programmable Logic Controller (PLC) Overview

WEEK 2: Jan 19 – Jan 25, 2025
        Chapters 2: PLC Selection, Components, and Communication.

WEEK 3: Jan 26 – Feb 1, 2025
        Chapter 3: Number Systems and Code

WEEK 4: Feb 2 – Feb 8, 2025
        Chapter 4: Input/output Devices and Motor Controls

WEEK 5: Feb 9 – Feb 15, 2025
        Chapter 6: PLC Programming

WEEK 6: Feb 16 – Feb 22, 2025
        Chapters 8: PLC Timer Instructions

WEEK 7: Feb 23 – March 1, 2025
        Mid-Term Review (posted online)
        Lab Exercise 1: Familiarization with the PLC Trainer and RSLogix Micro
        Print Ex-1-FESTO PLC Basic Prog Student Manual from Canvas before coming to the lab

WEEK 8: March 2 – March 8, 2025
> Mid Term Exam
> Lab Exercise 2: Online Operations and Monitoring I/O Data Files
> Print EX-2-PLC FESTO Basic Prog Student Manual from Canvas before coming to the lab.

WEEK 9: March 9 – March 15, 2025
> Lab Exercise 3 & 4: Relay Instructions Part I and II
> Print EX-3&4 - PLC FESTO Basic Prog Stu Manual from Canvas before coming to the lab.

WEEK 10: March 16 – March 22, 2025
> Spring Break, No classes

WEEK 11: March 23 – March 29, 2025
> Chapters 9: PLC Counter Instructions
> Lab Exercise 5: Timer Instructions
> Print EX-5&6 - PLC FESTO Basic Prog Stu Manual from Canvas before coming to the lab.

WEEK 12: March 30 – April 5, 2025
> Chapter 11: PLC Compare, Jump, and MCR Instructions
> Lab Exercise 6: Counter Instructions
> Print EX-5&6 - PLC FESTO Basic Prog Stu Manual from Canvas before coming to the lab.

WEEK 13: April 6 – April 12, 2025
> Chapter 15: Sequencer Instructions
> Lab Exercise 7: Comparison Instructions
> Print EX-7 - PLC FESTO Basic Prog Stu Manual from Canvas before coming to the lab

WEEK 14: April 13 – April 19, 2025
> Lab Exercise 9: Sequencer Instructions
> Print EX-9 - PLC FESTO Basic Prog Stu Manual from Canvas before coming to the lab

WEEK 15: April 20 – April 26, 2025
> Review for Final Exam (posted online)
> Extra Credit Lab Exercises on Traffic Light, Electro-pneumatic, EMS DC motor,
> Steeper Motor or Bottling Process

WEEK 16: April 27 – May 2, 2025
> Final Exam

Date of Final Exam: Available online from Mon 4/26/2025 to Fri 5/2/2025.

Last Date to Withdraw from course(s): Monday, March 31, 2025.

Census Date and Policies: Refer to the respective section below.

Technology Access:

    This course is designed to be delivered via face-to-face meetings and dissemination of supplemental study/lecture resource materials online using Canvas and will require reliable technology. Required technology includes:

Hardware:

- Desktop or laptop computer with internet access.
  - Note: If your internet connection is down, you must see access to avenues such as the UTT computer lab (BEP249 or HPR 134) and a public library to complete and submit your work on time.

- A camera, microphone, and sound speakers.

   Software:

- A current operating system (Microsoft or Apple)
- A web browser (Internet Explorer, Chrome, Safari, Firefox, etc.)
- Access to Canvas and Patriot mail. Note: Google Chrome does not support JAVA. Please do not use it for Soft Chalk lessons.
- Microsoft Office (Available at no charge to the student at https://www.uttyler.edu/it/office365/proplus.php
- Note: Do NOT use Google Docs for writing assignments
- Also standard plug-ins like Java, Flash, QuickTime, Adobe Reader, or another FDF reader like Preview on the Mac.
- Other software, as noted in each module, such as E-Portfolio

Technical Support:

Technology-related problems (e.g., Patriot email, Canvas, access problem to the *my*UTTyler, etc.) can often solved by calling the UT Tyler Information Technology Hotline (903) 565-5555 x2 or by emailing them at itsupport@patriots.uttyler.edu. In your email, be sure to include:

- The title and number of the course
- The Canvas page in the question
- A description and message number for any error message that you receive
- What were you doing at the time you got an error message

Discrimination:

The policy of this department is to make your college experience as pleasant as possible. However, if you feel discriminated against, belittled, or not treated appropriately, please notify the instructor anonymously or in person immediately after class. It is not the intention of any of the faculty in this department to make your college experience unpleasant. Remember, the first step in the process is to inform the instructor so s/he can be aware of the problem and take corrective action. If the problem persists, please inform the department chair. The dean can then be notified if the problem continues after a few days.   A grievance can then be filed in the Office of Student Services if there has still been no change in the instructor's behavior. It should be noted that filing a grievance is a profound act and should NOT be done just because you received a bad grade on an exam or in the course. Communication is an effective tool to solve problems and is rarely used enough. Most people are not deliberately trying to upset you; they are unaware of your vantage point.

Offensive Language:
Any offensive language will not be tolerated in the classroom laboratory or online. How you speak to your friends outside the classroom is your business; however, when you are in the classroom, you must follow the University of Texas rules of conduct. **You will be asked to leave if your language or behavior is offensive.**

Required Activities Scheduled Outside of Regularly-Scheduled Class time (fees, tickets, procedures, and forms required):
Read the textbook, review notes, and complete assignments.

UT Tyler Honor Code

Every member of the UT Tyler community joins together to embrace Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

Students Rights and Responsibilities

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: http://www.uttyler.edu/wellness/rightsresponsibilities.php.

Artificial Intelligence Use Policy

UT Tyler is committed to exploring and using artificial intelligence (AI) tools appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional research approaches. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy.

I expect all work students submit for this course to be their own. I have carefully designed all assignments and class activities to support your learning. Doing your own work, without human or artificial intelligence assistance, is best for your efforts in mastering course learning objectives. For this course, **I expressly forbid using ChatGPT or any other artificial intelligence (AI) tools for any stages of the work process, including brainstorming.** Deviations from these guidelines will be considered a violation of UT Tyler's Honor Code and academic honesty values.

Campus Carry

We respect the rights and privacy of students 21 and over duly licensed to carry concealed weapons in this class. License holders must behave responsibly and keep a handgun secure and concealed. More information is available at http://www.uttyler.edu/about/campus-carry/index.php

Tobacco-Free University

All forms of tobacco will not be permitted on the UT Tyler campus, branch campuses, or any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, university affiliates, contractors and visitors. Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products. There are several cessation programs available to students looking to quit smoking, including counseling quit-lines and group support. For more information on cessation programs, please visit http://www.uttyler.edu/tobacco-free.

Grade Replacement/Forgiveness and Census Date Policies

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. (For Spring, the Census Date is Jan 25) Grade Replacement Contracts are available in the Enrollment Services Center or at http://www.uttyler.edu/registrar. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions of which students need to be aware. These include:
- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, and approvals for taking courses such as Audit, Pass/Fail, or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

State-Mandated Course Drop Policy

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date).
Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

Disability/Accessibility Services

In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Tyler at Texas offers accommodations to students with learning, physical, and/or psychological disabilities. If you have a disability, including non-visible a diagnosis such as a learning disorder, chronic illness, TBI, PTSD, or ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit https://hood.accessiblelearning.com/UTTyler and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with an Accessibility Case Manager. For more information, including filling out an application for services, please visit the SAR webpage at http://www.uttyler.edu/disabilityservices, the SAR office located in the University Center, # 3150, or call 903.566.7079.

Student Absence Due to Religious Observance

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

Student Absence for University-Sponsored Events and Activities

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks before the date of the planned absence. At that time, the instructor will set a date and time when make-up assignments will be completed.

Social Security and FERPA Statement:

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

Emergency Exits and Evacuation:

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor during the first week of class. Do not re-enter the building unless given permission by University Police, Fire Department, or Fire Prevention Services.

Student Standards of Academic Conduct: Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give an unfair advantage to a student or the attempt to commit such acts.

(i)　"Cheating" includes, but is not limited to:
- copying from another student's test paper;
- using, during a test, materials not authorized by the person giving the test;
- failure to comply with instructions given by the person administering the test;
- possession of materials during a test that is not authorized by the person giving the test, such as class notes or specifically designed "crib notes." The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test;
- using, buying, stealing, transporting, or soliciting in whole or part the contents of an un-administered test, test key, homework solution, or computer program;
- collaborating with or seeking aid from another student during a test or other assignment without authority;
- discussing the contents of an examination with another student who will take the examination;
- divulging the contents of an examination for the purpose of preserving questions for use by another when the instructor has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;
- substituting for another person or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment;
- paying or offering money or other valuable thing to, or coercing another person to obtain an un-administered test, test key, homework solution, or computer program or information about an un-administered test, test key, home solution, or computer program;
- falsifying research data, laboratory reports, and/or other academic work offered for credit;

- taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
- misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.

(ii) "Plagiarism" includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another's work and the submission of it as one's own academic work offered for credit.

(iii) "Collusion" includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.

(iv) All written work that is submitted will be subject to review by SafeAssign™, available on Canvas.

UT Tyler Resources for Students:

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu, http://www.uttyler.edu/writingcenter/
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu, https://www.uttyler.edu/tutoring/
- The Mathematics Learning Center, RBN 4021: This is the open access computer lab for math students, with tutors on duty to assist students enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254) https://www.uttyler.edu/counseling/

Note: The instructor reserves the right to modify this syllabus. However, the Canvas course's Syllabus link will have the most updated syllabus at any point in the semester.