Programmable Logic Controllers

COURSE DESCRIPTION
Introduction to PLCs and their use in industrial automation. Topics include programming, counters, timers, interrupts, and process control applications.

TEXTS
(Required)

(Optional for Home Practice)
LAB MANUALS (LogixPro Simulator Included)

INSTRUCTIONAL METHODS AND ACTIVITIES
Methods and activities for instruction include the following: lectures, group discussions, homework assignments/solutions, lab experiments/exercises, software simulation, and a project.

ENGINEERING LIBRARY RESOURCES
The Mary and Jeff Bell Library houses substantial engineering reference materials available for research and coursework support. Designated coursework will require access and use of these resources as a portion of the grade for assigned work.

EVALUATION AND GRADE ASSIGNMENT
Evaluation of student performance is based on homework assignments, two midterms, lab experiments/exercises, a project, and a final exam. Tests, except the final, are graded and returned within a week from the date they are taken. No makeup exams are given in this course. You may examine the final exam within four weeks after the final grades are mailed to you. The final grade is assigned as follows.

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
<th>If</th>
<th>Tentative Grade</th>
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</thead>
<tbody>
<tr>
<td>Midterm 1</td>
<td>15</td>
<td>90 ≥ Total</td>
<td>A</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>15</td>
<td>80 &lt; Total &lt; 90</td>
<td>B</td>
</tr>
<tr>
<td>Project</td>
<td>15</td>
<td>70 ≤ Total &lt; 80</td>
<td>C</td>
</tr>
<tr>
<td>Homework</td>
<td>15</td>
<td>60 ≤ Total &lt; 70</td>
<td>D</td>
</tr>
<tr>
<td>Labs</td>
<td>20</td>
<td>Total &lt; 60</td>
<td>F</td>
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<tr>
<td>Final exam</td>
<td>20</td>
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Note: You must have a grade of 70 or above for your Labs to pass the course.
STUDENT LEARNING OUTCOMES
At successful completion of this course, students will have demonstrated their ability to:

- State the major components and features of PLCs & select the proper PLC for a given application.
- Differentiate between digital, analog, and intelligent I/O modules.
- Use a PLC instruction set and addressing modes to write IEC 1131-3 programs (Ladder Logic)
- Learn and program a PLC for applications that include counters and timers.
- Learn and program a PLC for process control applications.
- Learn to Interface I/O devices to a PLC
- Develop a PLC program to control automation equipment

SAFETY
The safety of students, faculty, staff and visitors to the ET laboratories is of paramount importance to the ET programs. You must follow safety procedures and use personal protective equipment as required in each laboratory. Any student that attempts to use equipment without authorization or that violates any safety policy or regulation will be immediately removed from the laboratory.

FOOD AND DRINKS
Eating/drinking is not permitted in the LAB.

ATTENDANCE POLICY
You must attend all classes. You are responsible for any materials covered or handed out or announcements made in your absence either excused or unexcused. Records of your attendance will be maintained. Students missing classes (6 or more) without the instructor's permission may be withdrawn from the course.

Tardiness without the prior consent of the instructor is not accepted and is counted as partial absent.

Academic Integrity/Plagiarism.

University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in Grade F.

Preferred methods of scholarly citations

Classroom/professional behavior
Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.
ACADEMIC HONESTY

University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) The instructor reserves the right not to grade, or grade only partially any of the submitted assignment. During an assignment you are allowed to have only what is permitted by instructor, anything else (cell, notebook, book etc) encounter in your possession will be considered cheating and a proceeding to penalized and document such an act will take place.

Grade Appeals

As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at http://www.tamucc.edu/provost/university_rules/index.html, and the College of Science and Engineering Grade Appeals webpage (http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

Disabilities Accommodations

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call or visit Disability Services at (361) 825-5816 in Corpus Christi Hall 116.

If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

Statement of Academic Continuity

In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

Dropping a Class

I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with me before you decide to drop to be sure it is the best thing to do. Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class.
ASSIGNMENTS
Late assignments are not normally accepted. The student will receive a zero on assignments that are
turned in after the due date unless a written permission (by email) is secured (from the instructor) prior to
the due date. Assignments may be turned in before the due date (they may be left in my mailbox, sent
with a classmate, mailed, etc.). Note that hardware or software failure or machine unavailability does not
merit an extension on the assignment.

LAB EXPERIMENTS
The goal of the laboratory sessions is to analyze and verify the theoretical ideas learned in the classroom.
Most experiments require written reports. The report is typically due one week after the experiment is
performed if no due date given. Late reports are not normally accepted. Reports, however, may be turned
in before the due date (they may be left in my mailbox, sent with a classmate, mailed, faxed, etc.). Students are expected to work more hours than scheduled to finish the experiments.

FINAL PROJECT
Students, individually or in groups, must complete a final project. Project ideas and guidelines will be
handed out in class.

EMAIL ADDRESS
When necessary I will be sending information to your e-mail address as written in your Islander
Blackboard. If you prefer you may change this to a personal address. It is your duty to update this and to
check your e-mail often; I suggest at least once a day

TENTATIVE WEEKLY SCHEDULE

<table>
<thead>
<tr>
<th>WK</th>
<th>Week of</th>
<th>Readings</th>
<th>Topics</th>
<th>Exams</th>
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<tbody>
<tr>
<td>1</td>
<td>8/25</td>
<td>Ch. 1</td>
<td>Introduction, An Overview of PLCs</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>9/1</td>
<td>Ch. 2</td>
<td>PLC hardware components</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>9/8</td>
<td>Ch. 2</td>
<td>PLC hardware components</td>
<td></td>
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<tr>
<td>4</td>
<td>9/15</td>
<td>Ch. 3</td>
<td>Number systems and codes</td>
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<td>5</td>
<td>9/22</td>
<td>Ch. 4</td>
<td>Fundamentals of logic</td>
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<td>6</td>
<td>9/29</td>
<td>Ch. 5</td>
<td>Basics of PLC programming</td>
<td>MID 1</td>
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<tr>
<td>7</td>
<td>10/6</td>
<td>Ch. 5</td>
<td>Basics of PLC programming</td>
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<tr>
<td>8</td>
<td>10/13</td>
<td>Ch. 6</td>
<td>PLC wiring diagrams &amp; ladder logic</td>
<td>Group project proposals due</td>
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<tr>
<td>9</td>
<td>10/20</td>
<td>Ch. 6</td>
<td>PLC wiring diagrams &amp; ladder logic</td>
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<tr>
<td>10</td>
<td>10/27</td>
<td>Ch. 7</td>
<td>Programming Timers</td>
<td>Start group project</td>
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<tr>
<td>11</td>
<td>11/3</td>
<td>Ch. 8</td>
<td>Programming counters</td>
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<tr>
<td>12</td>
<td>11/10</td>
<td>Ch. 9</td>
<td>Program control instructions</td>
<td>MID 2</td>
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<tr>
<td>13</td>
<td>11/17</td>
<td>Ch. 10</td>
<td>Data manipulation instructions</td>
<td>Project progress report due</td>
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<td>14</td>
<td>11/24</td>
<td>Ch. 11</td>
<td>Math instructions</td>
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<td>15</td>
<td>12/3</td>
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<td>Project report and demo due</td>
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<td>Date: TBA</td>
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<td>FINAL</td>
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* Changes, if any, will be announced in class

NOTE1: Labor Day Holiday 9/1 – No classes
NOTE2: Last day to drop a class 11/7
NOTE3: Campus is closed for Thanksgiving, 11/27-11/28
NOTE4: Last day of classes 12/2