

**Oklahoma State University Institute of Technology**  
**Face-to-Face Common Syllabus**  
Fall 2017

**ETDE 2113 Introduction to Programmable Logic Controllers**

This is an introductory course in programmable logic controllers (PLC's) and their applications. Topics include ladder logic diagrams, input and output modules, power supplies, selection and installation of controllers, and interfacing controllers with equipment. Upon successful completion, the student should be able to install PLC's and create basic programs.

**Course Purpose:**

The purpose of the course is to introduce Ladder logic programming concepts in order to program PLCs and to understand their principles of operation by simulating them under industrial setting.

**Type of Course:** Theory/Lab

**Credit Hours:** 3; Total clock hours of theory per semester: 30;

Total clock hours of lab per semester: 45; Total clock hours of clinical per semester: N/A.

**Class Length:** Full Semester

**Class Days and Times:** TR: 7:30 am to 9:55 am

**Prerequisites:** ETDE 1343

**Instructor Name:** Mark Threadgill

**Instructor Phone:** (918) 293-4749

**Office:** ET bldg. A11, Room 15N

**Instructor Email:** [mark.threadgill@okstate.edu](mailto:mark.threadgill@okstate.edu)

**Contact:** My preferred method of contact is by email. Please allow 24-48 hours to return your correspondence during the normal work week.

**Instructor's Office Hours:** By appointment.

**School Name:** Engineering Technologies

**School Main Phone:** 918-293-5150

**REQUIRED TEXT, REFERENCES, AND MATERIALS**

**Texts:** Programmable Logic Controllers, 5<sup>th</sup> edition by Frank D. Petruzella ,  
McGraw Hill, ISBN #978-0-07-337384-3

**Software:** Logixpro 500

**References:** N/A

**Materials:** Notebook, pen or pencil, thumb drive.

**Uniform/Tools:** N/A

**Estimated Cost for Materials:** \$ 160

**Estimated Cost for Uniform/Tools:** N/A

**Optional Resources:** N/A

**Upon completion of the course, students should:**

<b>Course Objectives</b>	<b>Assessment of Objectives</b>
Students will be able to predict the operation of the PLC when shown a Ladder Logic Diagram	Homework, Lab, Exam
Students will be able to apply Ladder Logic Programming Instructions to a Virtual PLC, and simulate its operation within a virtual environment	Lab
Students will be able to distinguish (identify) hardware relay control logic, and convert hardware relay control logic into Ladder Logic Instructions	Homework, Lab Activities, Exam
Students will be able to identify PLC Hardware, and define PLC modules to interface with field devices	Homework, Lab, Exam
Students will be able to identify Ladder Logic Instructions within a Ladder Logic Diagram (schematic), and predict the operation of the logic	Homework, Lab, Exam
Students will be able to solve narrative process and control problems with Ladder Logic Instructions, and apply their solutions through programming sequence with the LogixPro-500 simulator	Homework, Lab, Exam
Students will be able to define program control structures, and apply their knowledge through the design of equipment machine control logic and feedback loops	Lab
Students will be able to distinguish memory types and addressing schemes within the structure of a PLC	Homework, Exam
Students will be able to identify Discrete Field Device Symbols, and their Operation with a Control System Feedback Loop	Homework, Exam
Students will be able to define Digital Logic Concepts, and its application within Ladder Logic Circuits that involve Counters and Timers, Sequencers and Shift Registers	Homework, Lab, Exam

Students will Solve Digital Math Problems using digital numbered (numeral) systems of Base 2, Base 8, Base 10, Base 16, BCD, and convert their solutions using Digital Conversion techniques and PLC Ladder Logic Instructions within a Ladder Diagram	Homework, Lab, Exam
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Aspects of the course objective assessments may be used in the university’s assessment of student learning. If applicable, an asterisk (\*) above indicates this assignment is used in the university assessment program.

*(Please asterisk the assignment above if utilized for the assessment assignment.)*

**COURSE ACTIVITIES**

In this course students will:

- Participate in class discussions and activities.
- View videos that depict the various concepts.
- May participate in group and individual presentations.
- Compile a portfolio of work produced.
- Take examinations.
- Complete reading assignments.
- May be required to do quizzes.

**EVALUATION - GRADES WILL BE BASED ON THE QUALITY AND COMPLETION OF THESE TASKS:**

*(NOTE-Please indicate the course specific evaluations. List assignment(s) used in the university’s assessment of student learning as separate line items and marked with an asterisk.)*

Quizzes .....	10%
Homework .....	15%
Labs .....	40%
Exams .....	35%
Chapter Exams - 3	
Final Exam - 1	
<b>Total</b>	<u>100%</u>

<b>OSUIT Grading Scale</b>
A = 90%-100%
B = 80%-89%
C = 70%-79%
D = 60%-69%
F = 59% & below

\*The student’s grade for this assignment will be used in the university’s assessment of student learning. A 70% competency or higher receives a Pass rating. This Pass/Fail rating is independent of the student’s course grade.

Daily and/or weekly quizzes, small weekly assignments and similar type projects: Normal return time to student by next class meeting or no later than one (1) week.

Extensive assignments, large lab projects, extensive quizzes, exams and similar type projects: Normal return time to students in one (1) to two (2) weeks.

## **RECOMMENDED STUDENT COMPETENCIES/SKILLS**

Microsoft Windows, Microsoft Word

## **AUTHORIZED TOOLS**

### **Instructors Policy to Submit Work**

To provide students with improved feedback, technical documents shall be submitted electronically via D2L. To ensure students learn to submit documents electronically, students are required to submit work in pdf format and follow a pre-define template and format. Students will be asked to meet a goal in data recording and analysis by submitted data plots in pdf format (after creating in a Microsoft Excel or other professional software format) with the aid of team members and instructor advisement. All submissions must be submitted as **one** pdf document unless instructed otherwise. Documents that are not legible will be given a grade of zero. **NO EXCEPTIONS!**

### **Submission of Work**

1. All work **MUST** be submitted to D2L in one (1) PDF file.
2. **NO** JPEG or other type image files will be accepted.
3. Any type of image files submitted will receive 0 points and will not be graded.
4. **NO** work submitted by email will be accepted. The email will immediately be deleted.
5. **NO** scanned lab book pages of a lab can be submitted in a report except for the signature page.

### **E-Mail Communication Standards**

Students are encouraged to use e-mail when communicating personal issues with their instructor. E-mail corruption is a significant problem and unidentified e-mails are simply purged. Therefore a strict standard is necessary to identify a legitimate student communication. The “message line” of student e-mails must contain in order – Subject, Name, Course, and Trimester. Example:

**Missing Assignment, John Smith, ETDE 1263, Fall 2014.**

## **LATE WORK**

- **NO LATE WORK WILL BE ACCEPTED *unless it meets the requirements for an excused absence according to OSUIT policy or at instructors’ discretion.***
- **Quizzes and Group Activities** are in-class lecture assessments that cannot be made-up under any circumstances. Attendance is mandatory.
- **Research, Homework, Lab and Project** reports submitted before the posted due date and time on D2L or written assignment sheet is considered to be on time. Presentations **CANNOT** be made up.
- **Unit Exams and Final Exam** **CANNOT** be made up without strict approval and penalty! If you miss an exam, it cannot be made up unless your absence meets the requirements for an approved absence. Make-up exams may be different from the exam given in class and may be more difficult. If you know in advance that you will miss an exam, special arrangements to re-schedule the exam may be possible for hardship circumstances.

## **TESTING**

The following guidelines will be enforced during in class exams:

- All materials not required for the exam must be placed off the desk
- Scientific/Engineering Calculators are allowed unless otherwise noted
- Once testing has started you are not allowed to leave the room until you have completed the test. Doing so will immediately end the test for you.
- All material associated with the exam must be submitted upon completion.
- All tests will have a defined time for completion.
- Exceptions may be made to these rules at the instructor's discretion

## **OTHER LAB AND CLASSROOM POLICIES**

Students are expected to cooperate in maintaining a classroom environment conducive to learning. Courteous and respectful behavior will be expected from all students each day, every day.

Students will be expected to stay focused on the material being presented during lecture and lab and not to engage in any activity that will distract them or anyone else around them from the material being presented. Texting and inappropriate use of electronic devices is detrimental to the learning process. **Use of ear buds, headphones etc. is not allowed in the classroom at any time. TEXTING and other such disruptive activities will not be permitted during both lecture and lab.** If you choose to do so anyway, I will document this fact and deduct points accordingly with the date and time of the occurrence. So, please do not do these activities. If you feel you must respond to an emergency text, then please leave the area then return when you have finished your texting. The use of tobacco in any form in University buildings is prohibited.

- Students are not allowed to listen or watch any type of electronic device at any time in the classroom environment.
- Students are expected to maintain a clean and organized lab work place. After completion of a lab or at the end of the class period, components must be returned to the appropriate storage location they were obtained from. Instruments, test probes, and any items used to perform an experiment must also be returned to the appropriate storage location. All other instruments must be turned-off.
- Class computers are to be used for teaching/learning only. Do not use for entertainment or casual internet surfing or chatting.
- Students are expected to maintain a respectful manner during class. Sleeping or otherwise assuming a laid down position will not be tolerated.
- Safety Glasses are required while in the lab setting. NO EXCEPTIONS!
- NO FOOD OR DRINK IN LAB/COMPUTER AREA!
- Students are expected to check D2L and e-mail for announcements and assignments on a regular basis.
- All research assignments, written formal Lab Reports, project work, etc. must be submitted in the appropriate folder in the D2L drop box by the due date and time.

**Dress Code**

1. Shoes must cover entire foot.
2. Clothing with obscene logos are not to be worn.
3. Hats and sunglasses may not be worn in the classroom setting.
4. Clothing that is saggy/baggy should not be worn for safety reasons.
5. Jewelry should be removed in the lab setting.

**SYLLABUS ATTACHMENT**

View the Syllabus Attachment, which contains other important information, by visiting [http://osuit.edu/center/student\\_syllabus\\_information](http://osuit.edu/center/student_syllabus_information)

<b>Course Schedule</b>			
<b>Course Outline Schedule</b>	<b>Topic</b>	<b>Assignment</b>	<b>Due Date</b>
<i>Day/Week 1</i>	Overview		
<i>Day/Week 2</i>	PLC Hardware components	Homework 1	9/22/17
<i>Day/Week 3</i>	Number Systems & Codes		
<i>Day/Week 4</i>	Fundamentals of Logic	Exam 1 Homework 2	9/22/17 10/6/17
<i>Day/Week 5</i>	Basics of PLC Programming		
<i>Day/Week 6</i>	Programming Counters	Lab 1	9/29/17
<i>Day/Week 7</i>	Programming Timers	Homework 3	10/13/17
<i>Day/Week 8</i>	Developing Fund. PLC wiring diagrams and ladder logic programs	Exam 2 Lab 2	10/27/17 10/13/17
<i>Day/Week 9</i>	Program Control Instructions	Lab 3	10/27/17
<i>Day/Week 10</i>	Data Manipulation Instructions	Lab 4 Homework 4	11/10/17 10/27/17
<i>Day/Week 11</i>	Math Instructions	Exam 3	11/17/17
<i>Day/Week 12</i>	Sequencer and Shift Register Instructions	Lab 5 Homework 5	12/1/17 11/17/17
<i>Day/Week 13</i>	PLC Installation	Lab 6	12/8/17
<i>Day/Week 14</i>	PLC Editing and troubleshooting		
<i>Day/Week 15</i>		Final Exam Review Grade	12/12/17 12/14/17

Schedule is subject to change at instructor discretion.