



Course Syllabus

Course: EET-2850 Course Name: Instrumentation & Process Controls 2

Engineering & Industrial Division

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Class Days: Monday/Wednesday Class Time:
Location: Classroom: E-105 Laboratory: E-101/105
Credit Hours: 4 Contact Hours: 5 Lab Hours: 3 Lecture Hours: 2

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Course Description:

This course will study the concepts and applications of industrial process control systems. Various methods of control will be studied as well as hardware, symbology, and process control diagrams. Industrial Programmable Controllers will be utilized as the primary source of control for both process and loop control.

Prerequisite(s): EET-2830 Instrumentation & Process Controls I

Co-requisite(s): EET-2790 Programmable Controllers 2

Entry Level Skills and Knowledge: Computer Literacy

Required Texts, Supplies and Equipment:

TEXT: Industrial Electronics by Thomas Kissell
EET 285 – Notes, lab, and project packet
Hand tools will be provided

Grading:

Table with 2 columns: Item, Percentage. Rows include Oral Exam (FINAL) 15%, Written Test 20%, Proficiency lab test (Troubleshooting) 20%, Projects 35%, Process program 10%.

- 1 Basic Water Table Operation (PLC-5)
2 Basic Level PID Loop (PLC-5) (also used for final exam)
3 Basic Temperature Loop (SLC-500)
4 Basic Temperature Loop (PLC-5)
5 Basic Temperature Loop (Controllogix)
6 Time Proportioning Loop (PLC-5 or Controllogix)
7 HMI Control of temperature loop

(Projects will be accompanied by full documentation and tuning variables.)

GRADING:	92 - 100	A
	84 - 91	B
	76 - 83	C
	68 - 75	D
	0 - 67	F

Any project that is turned in past the due date and time will have its grade lowered 10% for each day that it is late.

### **Learning Outcomes:**

#### General Education

1. **Communicate effectively**
2. **Evaluate arguments in a logical fashion**—Competence in analysis and logical argument are explicit learning goals for most general education programs, although these skills go by a variety of names (e.g., critical thinking, analysis, logical thinking, etc.). **Students will be able to demonstrate competence in problem solving in communication, mathematics, and in team settings.**
3. **Employ the methods of inquiry characteristic of natural sciences, social sciences, mathematics, and the arts and humanities;** general education introduces students to methods of inquiry in several fields of study and thereby prepares students to integrate information from different disciplines.

#### General Education:

Communicate effectively

Evaluate arguments in a logical fashion—Competence in analysis and logical argument are explicit learning goals for most general education programs, although these skills go by a variety of names (e.g., critical thinking, analysis, logical thinking, etc.). Students will be able to demonstrate competence in problem solving in communication, mathematics, and in team settings.

Demonstrate an understanding of cultural differences and the knowledge of how to work effectively in a global and diverse culture and society.

#### Mathematics: Problem solving

Reasoning  
 Connecting with other disciplines  
 Communicating  
 Using Technology  
 Developing math power  
 Number sense  
 Function

#### Oral & written communication skills: Problem solve

Evaluate sources  
 Organize  
 Listen  
 Use conventions of standard English  
 Communicate effectively orally

## Technical

1. Explain how proportional, integral and derivative values affect a closed loop system.
2. Calibrate various types of industrial process sensors.
3. Develop piping diagrams using approved systems.
4. Zero and span of an amplifier.
5. Correctly use the Ziegler-Nichol method for determining P,I,D values. (PLC open loop)
6. Correctly use the Ziegler-Nichol method for determining P,I,D values. (PLC closed loop)
7. Correctly size I/O devices for a working level loop
8. Correctly program and tune a process control

### Assessment of Student Learning:

This course may include a project that is one of several that will be used by faculty to assess student academic performance in the program. A panel of faculty will review all (projects or whatever assessment activity you are doing), then assess and summarize the academic performance of students at this point in the program. The results of this assessment will be shared among the department faculty, used to identify needed changes or improvements, and submitted to the Student Academic Assessment Committee as part of the college's overall student academic assessment effort.

Assessment Project and Measurement in course (if any): None

### Plan of Work:

Week	Activities
1	Identifying AB Inputs & Outputs On Water Simulator Table
2	Operation of Inputs & Outputs, PID Diagram, Motor Valve, VFD, Water Temp Amp T/C, RTD, Level, Flow sensors, Temperature Loop on Table
3	Automatic Process Control (PID instruction PLC-5)
4	<b><u>Project 1</u></b> due (Basic Water Table Operation (PLC-5))
5	Time Proportioning control Indirect addressing
6	Test 1
7	<b><u>Project 2</u></b> due (Basic Level PID Loop (PLC-5))
8	Automatic Process Control (Scaling, scaling with parameters instructions SLC-500)

- 9            **Project 3** due (Basic Temperature Loop (SLC-500))
- 10           Auto Tuning, recorders
- 11           **Project 4** due Basic Temperature Loop (PLC-5))
- 12           Test 2
- 13           Cascade Control
- 14           **Project 5** due - Basic Temperature Loop (Controllogix)  
Scheduled final exams & Proficiency Test
- 15           **Project 6** due - Time Proportioning Loop  
Scheduled final exams & Proficiency Test
- 16           **Project 7** due - 7 HMI Control of temperature loop  
Scheduled final exams & Proficiency Test

### Policies

Course Withdrawing: If for any reason you need to withdraw from this course, be certain that you do so according to College procedure. It is your responsibility to know and follow this procedure. If you simply stop coming to class, without officially withdrawing from the course, your grade is an automatic "F." Please follow official College procedure for withdrawing from this or any course.

*College Academic Policies are located in the College Catalog. A copy of the current catalog may be picked up in any of the divisional offices or admissions. The list of college policies are also available online at <https://www.terra.edu/register/Collegecat/policies.asp>.*

Support Services: The College offers a number of support services to assist in your success in this course and all courses. Among these services are the Writing & Math Center in B105, the Office of Learning Support Services, which coordinates the campus disability services and tutoring programs, the computer labs, and the computers in the atriums.

Any student who feels he/she may need an accommodation based on the documentation of a disability should the Office of Learning Support Services privately to discuss his/her specific issues. Please contact the OLSS at (419) 334-8400 X 208 or visit 100 Roy Klay Hall (Building A) to coordinate reasonable accommodations.

*If you have a documented disability and are receiving academic accommodations through the Office of Learning Support Services, please schedule a meeting with me in a timely manner so that we may discuss how these services will be arranged.*

Tutoring services are available to students beginning the second week of every quarter. Students requesting tutoring services should obtain a tutor request form from the OLSS in 100 Roy Klay Hall (Building A) or online at the Terra website. Please note that instructor verification and acceptance of the Student Learner Agreement is necessary for all tutoring requests. All requests should be submitted to 100 Roy Klay Hall (Building A).

As a courtesy to your instructor and fellow students, please turn off your cell phone and pagers or

place in vibrate mode. Please take and place your calls outside of the classroom. Emergency Personnel Excluded.

Do not modify, add, or delete any programs, drivers, screen savers, etc. from the Computers in E-101 or E-105. Doing so will result in your removal from class.