

Oklahoma State University Institute of Technology
Course Syllabus
Summer 2017

ETDE 4133: Process Control and Measurement

Course Description:

This is an advanced course in electronic/pneumatic instrumentation devices commonly used in process measurement and control systems. Students work in a teaming environment to apply various control methodologies (i.e., PID, etc.) to monitor and control process variables in solving real world problems. Upon successful completion, the student will be able to design, install, calibrate process measurement and control systems.

Type of course: Theory/Lab
Total Credit Hours: 3; Total hours of theory per semester: 30; Total hours of lab per semester: 45
Class length: Full Semester
Class days & times: MWF: 8.00 to 9.25 am
Prerequisites: ETDE 3223, ETDE 3233, ETDE 3513, MATH 2153

Instructor Name: Asif Hoque **Instructor Phone:** (918) 293-5375
Office: ET bldg. A11, Room 15J **Instructor E-mail:** asif.hoque@okstate.edu
Contact: My preferred method of contact is e-mail. Please allow 24-48 hours to return your correspondence during the normal work week.

Instructor's Office Hours: Monday, Wednesday, Friday: 10.30 am to 11.30 am
Tuesday, Thursday: 12.30 pm to 1.30 pm

Division Name: Engineering Technologies **Division Phone:** (918) 293-5150

REQUIRED TEXT, REFERENCES, AND MATERIALS

Texts: Instrumentation & Process Control by Kirk, Weedon. ATP publishers
References: Process Control by ISA
Materials: Basic class materials, calculator, jump drive
Uniform/Tools: Digital Multi-meter, ETDE toolkit or equivalent

Upon completion of this course, students should demonstrate the ability to:

Course Outcomes	Assessment Method
1. Distinguish between Cascade, Feedback and Feedforward control loops.	Exam, Homework
2. Interpret and update process flow diagrams and P&ID.	Exam, Homework
3. Explain the difference between open loop and closed loop control and give examples and uses of each.	Exam, Homework
4. Develop block diagrams and function blocks for control systems.	Exam, Homework
5. Tune a PID controller and demonstrate the impact on a control systems.	Lab
6. Demonstrate knowledge of accuracy, precision, sensitivity, repeatability, reproducibility, and turndown and measurement uncertainty.	Exam, Homework
7. Design and construct a process control system for single variable manipulation that utilizes pressure, level, temperature, and flow measurement devices and microcontrollers	Lab

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

Lab.....30%
 2 Unit exams.....20%
 Homework20%
 Presentations.....10%
 Final Exam.....20%

OSU-IT Grading Scale
A = 90.00 - 100.00
B = 80.00 - 89.99
C = 70.00 - 79.99
D = 60.00 - 69.99
F = 00.00 - 59.99

POLICY ON ABSENCES

You are expected to attend all classes and participate fully in the activities. Due to the rigor of this course, excessive absences will be detrimental to course grade.

LATE ASSIGNMENT POLICY

Late work will not be accepted. Make-up exams will not be given unless you have a valid medical, military or judicial excuse which your doctor, your commander or your judge must provide.

OTHER LAB AND CLASSROOM POLICIES

The college environment is one in which various ideas, philosophies, and sensitive topics are explored. The open and respectful pursuit of knowledge will require that each person be allowed to share opinions that may not be popular or accepted by all. Language or gestures that are non-inclusive, derogatory, or disrespectful of diverse backgrounds, cultures, ethnicities, religions, genders, and/or sexual orientations will not be tolerated.

- The use of tobacco in any form is not permitted in the building.

- Cell phones must be turned off unless there is a medical need.
- Audio equipment is not permitted.
- Food and beverage is permitted but not around the equipment. Only liquids with screw type closures are allowed.
- Lab computers are to be used for teaching/learning only. Do not use for entertainment or casual internet surfing or chatting. This is especially true during class.
- Students are expected to maintain a respectful manner during class-sleeping or otherwise assuming a laid down position will not be tolerated.
- Tests will not be given early.
- The lab is considered an industrial environment, therefore you must adhere to proper safety and operations protocols. Do not endanger yourself or others.

Dress Code

1. **Shoes must cover entire foot.**
2. **Shorts/Dresses must cover the knees.**
3. **Tank tops/muscle shirts are not to be worn.**
4. **Clothing with obscene logos are not to be worn.**
5. **Clothing that is distracting may not be worn in the classroom setting.**
6. **Clothing that is baggy should not be worn for safety reasons. Jewelry should be removed in the lab setting.**
7. **Safety glasses must be worn when appropriate.**

DESIRE TO LEARN

STUDENTS ARE EXPECTED TO CHECK D2L ON A REGULAR BASIS.

UNIVERSITY & COURSE EXPECTATIONS

It is the responsibility of each OSUIT student to read, abide by and maintain a copy of the syllabus for this course. Syllabi are available on the OSUIT website.

Students understand that excerpts or portions of their work may be utilized for institutional assessment purposes. The purpose of institutional assessment is for verification of student learning and program improvement. Every effort will be made to keep this information confidential.

ATTENDANCE POLICY FOR FACE-TO-FACE COURSES

A primary component of OSUIT's Mission is "to prepare and sustain a diverse student body as competitive members of a world-class workforce." Regular and consistent attendance not only aids in academic success, dependable attendance is a requirement in today's real-world employment; therefore, regular and consistent attendance is a requirement in all OSUIT courses.

Definitions: Absent: Failing to attend all or a significant portion of a class or lab session.

- A. Students may not be marked as absent if missing class for situations such as, but not limited to
 1. participating in a required university activity such as a field trip;
 2. fulfilling a military obligation;
 3. a mandatory court appearance;
 4. death in the immediate family;

5. extreme illness or accident to oneself or immediate family. Instructors, at their discretion, may require proof of such events.
- B. It is the responsibility of the student to contact and inform the instructor and/or department in advance of such excused absences whenever possible.

Tardy: Arriving late to class as defined by the individual class instructor. Faculty, at their discretion, may equate three tardies to equal one absence.

Procedures:

Early Intervention

- A. Any student who misses 10% of an individual course (or earlier at faculty discretion) during a regular fifteen-week semester, or the equivalent portion of time in a shorter session, will have their name submitted by that course instructor to the OSUIT Early Alert System for retention intervention.
- B. At the point the Early Alert is issued, the student *must* meet with their assigned faculty advisor or designated faculty/staff member within seven (7) academic calendar days for counseling on how to improve their attendance and academic success.

Excessive Absences

- A. The University reserves the right to administratively withdraw any student from an individual course who misses 20% of that course, whether excused or unexcused, and, in the opinion of the instructor, the student does not have a reasonable opportunity to be successful in the course.
- B. Students should be aware any of the following may impact their financial aid:
 1. being administratively withdrawn from a course
 2. dropping a course
 3. their last date of attendance in a course

Please see OSUIT Policy 2-021 for full details and procedures.

Americans with Disabilities ACT (ADA)

According to the Americans with Disabilities Act, each student with a disability is responsible for notifying the University of his/her disability and requesting accommodations. If you think you have a qualified disability and need special accommodations, you should notify the instructor and request verification of eligibility for accommodations from the Office of Academic Accommodations/LASSO Center. Please advise the instructor of your disability as soon as possible, and contact The LASSO Center, to ensure timely implementation of appropriate accommodations. Faculty have an obligation to respond when they receive official notice of a disability but are under no obligation to provide retroactive accommodations. To receive services, you must submit appropriate documentation and complete an intake process during which the existence of a qualified disability is verified and reasonable accommodations are identified. The LASSO Center is located on the 3rd floor of the Noble Center. You may call 918.293.4855 for more information or fax documentation to 918.293.4853.

ACADEMIC DISHONESTY

Academic dishonesty or misconduct is neither condoned nor tolerated at OSUIT. Any student found guilty of academic dishonesty or misconduct shall be subject to disciplinary action. Academic dishonesty and/or misconduct includes, but is not limited to, the following actions: (1) Plagiarism: the representation of previously written, published, or creative work as one's own; (2) Unauthorized collaboration on projects; (3) Cheating on examinations; (4) Unauthorized advance access to exams;

(5) Fraudulent alteration of academic materials; (6) Knowing cooperation with another person in an academically dishonest undertaking. Students are required to actively protect their work against misuse by others. For details, refer to The OSUIT Student Handbook (Student Rights and Responsibilities Governing Student Behavior) available online at http://www.osuit.edu/academics/forms/student_rights_responsibility.pdf.

Course Outline Schedule	Topic	Assignment	Due Date
<i>Week 1</i>	Overview & Basic Principles		
<i>Week 2</i>	Basic Control Concepts & Functional Structure of Feedback and Control		
<i>Week 3</i>	Sensors and Transmission Systems	Homework 1	05/17/17
<i>Week 4</i>	Typical Measurements & modelling		
<i>Week 5</i>	Modelling & Controllers	Exam 1	05/31/17
<i>Week 6</i>	Control Valves	Lab 1	06/07/17
<i>Week 7</i>	Process Dynamics & diagram	Homework 2	06/14/17
<i>Week 8</i>	Tuning Control Systems		
<i>Week 9</i>	Cascade Control	Lab 2	07/12/17
<i>Week 10</i>	Feedforward and Multivariable Control	Exam 2	07/19/17
<i>Week 11</i>	Special Purpose Concepts	Homework 3	07/26/17
<i>Week 12</i>	Dead Time Control	Lab 3	08/02/17
<i>Week 13</i>	Nonlinear Compensation and Adaptive Control	Homework 4	08/09/17
<i>Week 14</i>	Control System Architecture	Presentation	08/16/17
<i>Week 15</i>	Review	Final Exam	08/23/17

*Schedule is subject to change at instructor discretion.

