ME 36500 Systems, Measurements, and Control I
ORGANIZATION AND COURSE POLICY

This course is the first half of a two-semester introduction to the related concepts of systems, measurements, and control. To allow for "hands-on" experience with these important engineering topics, you are required to obtain a National Instruments myRIO micro-controller (available from Follett's Bookstore). You will use this device for homework and laboratory assignments throughout ME 36500 and ME 37500 (and ME 47500 if you choose that as a restricted elective course). We hope you will also use the myRIO for your senior design course ME 46300 as well.

1. **Pre-lectures**: Most lectures will be introduced with a pre-recorded video covering key introductory concepts. These pre-recorded video lectures are posted on the Blackboard website. You are required to watch the videos, and complete an associated quiz (see below), before coming to lecture. If you are not familiar with this introductory material, you may have difficulty following the lecture discussion.

2. **Pre-lecture Quizzes**: In advance of each lecture, you are required to complete a quiz that covers the pre-lecture video material. The quiz is administered on the course Blackboard website, opening up approximately a day before each lecture, and closing 30 minutes before your lecture begins. You have two tries to complete each of 4 problems, and the higher score from the two attempts is recorded. It should not take you more than 10-15 minutes to complete each quiz.

   If you lose your internet connection while taking the quiz (either due to a bad WiFi connection or leaving your browser open too long), Blackboard will consider your quiz to have been submitted. Therefore, do not attempt the quiz in an area with a weak WiFi signal, and do not leave the quiz half-finished, intending to come back to it later!

3. **Lectures**: Class periods are used to discuss course material in detail and to apply concepts from the pre-lecture videos to example problems. For this arrangement to work, you must watch the pre-lecture videos in advance of each class.

   In addition to lectures, **recitations** are also scheduled every other week. These are additional times to discuss lecture material and go over example problems.

4. **Homework**: Homework is posted roughly every week on the Blackboard website, and should be submitted on the indicated due date, at the indicated time.
   - **No late homework is accepted**. Late means after the indicated time on the due date.
   - **Homework will be submitted electronically using Gradescope**. This means that you will need to scan your work and upload it to the Gradescope website for grading.
   - Solutions to the homework are available on the course Blackboard website after they have been collected.
   - Homework must be neat (in addition to being correct) to obtain full credit. Be sure to put your name, your lecturer's name and lecture time, and your HWID at the top of each page. **Start on a new sheet of paper for each problem**! (See the Homework Format Template at the end for details of the format to follow.)
   - Homework assistance may be obtained during office hours. A timetable will be posted on the Blackboard website at the start of the semester.

5. **myRIO Homework**: Five additional homework assignments will involve hands-on measurements and simulations using your myRIO. It is intended that these exercises help you learn to program the myRIO, not just execute programs that have been given to you. These assignments are to be submitted, during the week they are due, to your lab TA at the beginning of your lab period.

6. **Laboratory**: The laboratory is an integral part of the course, and you will complete a number of standard experiments during the semester. About two-thirds of the experiments use the myRIO directly, and the remainder incorporate the myRIO through a laboratory interface. There will be a practical lab quiz during the semester. Labs meet **every other week**, so please make note of which week your lab meets.

   Satisfactory completion of ALL experiments and associated assignments is required to earn a passing grade in the course. Lab assignment scores will be penalized by 30% for every day the assignment is late. Even if you will receive a score of zero, because the assignment is more than three days late, each and every lab assignment must be submitted to receive a passing grade in the class. Submitted assignments will only be accepted if the teaching assistant feels a reasonable attempt has been made to complete the exercise. Also, except in extraordinary situations, any make-up labs must be completed within the same week of the original lab period following the **Laboratory Make-up Procedures and Policies**.

   Lab assignments, as with course homework, are to be prepared **independently**. Do not acquire previous lab reports or assignments used in this course with the intention of copying parts or all of the material. Plagiarizing all or part of a pre-lab, My-Rio HW, or lab report will result in the student being reported Office of Student Rights and Responsibilities (OSRR) for review at the university level and a grade penalty will be assessed of up to and including a failing grade in the class.

7. **Laboratory Make-up Procedures and Policies**: If you must miss a lab due to unavoidable circumstances (e.g., an interview, illness, accident, etc.), absences must be made up during the week the lab is scheduled by making arrangements with your lab TA to attend another lab section or a special make-up session. **Students should plan to complete the lab during the week in which it is assigned** because, in most cases, the laboratory equipment is disassembled at the end of the week to accommodate the upcoming ME 375 lab. *In the event of missing a lab*, follow the steps below to ensure you meet the laboratory attendance requirement for that lab.
   Step 1: Contact your TA when you know of a lab you must miss (this must be done before your scheduled lab period).
   Step 2: Arrange to attend another lab section your TA teaches, if space permits. If this is not possible, go to step 3.
   Step 3: Arrange to attend another lab section of a different TA.
   a. It is your responsibility to contact the TA and determine if space permits your attendance. Then let your TA know which lab you will be attending that week.
   b. When you attend the lab section of another TA, you must check-in with the TA when you arrive at lab. If this is not done, it will be assumed that you failed to complete that lab.
   c. When you complete the lab, turned in all materials to your regular lab TA at the due date for your regular lab section.

8. **Exams**: There will be two midterm exams during the semester (the first exam will be 8:00-9:00 pm on 10/2 in EE 129/EE170 and the second exam will be on 11/13 in EE 129/EE170). Please avoid scheduling anything else for these times and dates. Exams will be closed-book and closed-note. You are allowed to bring ONE letter-size (8.5 x 11 inches) hand-written single-sided "crib sheet" to Exam 1 and TWO letter-size hand-written single-sided crib sheets to Exam 2. An exam regrade must be requested in writing within one week after its original return. The final exam will be comprehensive and THREE letter-size (8.5 x 11 inches) hand-written single-sided crib sheets are allowed. Time, date and venue of the final exam will be announced later in the semester. **There will be no make-up examinations; contact your instructor prior to an exam if there are extenuating circumstances**. This course follows the ME authorized exam calculator policy; the only calculator allowed during ME 36500 exams is the **TI-30XIIs**.

9. **Grading**: Course grades will be based on the following point distribution (total points possible = 1000).

Midterm Exam 1	125
Midterm Exam 2	125
Final (Comprehensive)	250
Lecture Quizzes	75
Regular Homework	150
myRIO Homework	75
Laboratory	200

Class grading is not curved, and teaching assistant grading variations are accounted for. A straight scale is used: 97-100% A+; 93-97% A; 90-93% A–; 87-90% B+; 83-87% B; 80-83% B–; 77-80% C+; 73-77% C; 70-73% C–; 67-70% D+; 63-67% D; 60-63% D–; <60% F. The performance of students very close to, but below, a grade cut-off is reviewed in more detail, but no student in this category who does poorly (< 70%) in Homework, Quizzes or in Lab will be considered for an upgrade.

10. **Academic Integrity:** Students are expected to conduct themselves in a manner that follows good ethical standards. With perhaps a few exceptions, all students in this course should have previously signed an Academic Integrity Statement. Any violation of course policy, as it relates to academic integrity, will minimally result in a failing or zero grade for that assignment and the student will be reported to the Office of Student Rights and Responsibilities (OSRR), where University penalties, including removal from the university, are possible. Additionally, at the instructor's discretion, a failing grade may be assigned for the course. Please review the OSRR materials concerning academic integrity at: http://www.purdue.edu/odos/osrr/academic-integrity/index.html

ME 36500 BOOKS AND NOTES

Notes on course website:

1. ME 365 Systems and Measurements – Course Notes for the "old" ME 365 can be found at https://engineering.purdue.edu/me365/textbook.html (these notes may prove helpful in ME 37500, as well.)

Supplemental References available in the Library

Measurement Systems:

1. R.S. Figliola and D.E. Beasley, *Theory and Design for Mechanical Measurements*, 3rd edition, Wiley, 2000. (Good introduction. Served as a previous course text.)
2. A. J. Wheeler, A. R. Gandji, *Introduction to Engineering Experimentation*, 3rd edition, Prentice Hall, 2010. (Helpful reference on measurement systems, digital data acquisition, and uncertainty analysis.)
3. C.P. Wright, *Applied Measurement Engineering: How to Design Effective Mechanical Measurement Systems*, Prentice Hall, 1995.
   (Good overall reference on measurement systems, including frequency analysis.)
4. J.P. Bentley, *Principles of Measurement Systems*, 4th edition, Prentice Hall, 2005.
   (Used to be the text book for the course. 2nd half covers different types of transducers.)
5. E.O. Doebelin, *Measurement Systems: Application and Design*, 5th edition, McGraw-Hill, 2004.
   (Excellent reference for various transducers and measurement science.)
6. T.G. Beckwith, R.D. Marangoni, and J.H. Lienhard, *Mechanical Measurements*, 4th edition, Addison-Wesley, 1993.
   (Covers measurement concepts and details on how to measure different physical quantities.)
7. J.R. Taylor, *An Introduction to Error Analysis*, 2nd edition, University Science Books, Oxford University Press, 1997.
   (Helpful supplemental information for statistics; used to be required text.)
8. P. Horowitz and W. Hill, *The Art of Electronics*, 2nd edition, Cambridge University Press, 1989.
   (Op-amp and circuits reference book, nicely written.)

Modeling of Dynamic Systems:

1. W. J. Palm III, *System Dynamics*, McGraw-Hill, 3rd edition, 2010.
   (Previously used as text for ME 375.)
2. C.M. Close, D.K. Frederick, and J.C. Newell, *Modeling and Analysis of Dynamic Systems*, Wiley, 3rd edition, 2002. (Presents a unified approach to modeling of physical systems.)
3. K. Ogata, *System Dynamics*, Prentice Hall, 4th edition, 2004. (Solid reference on system modeling.)

Control of Dynamic Systems:

1. G.F. Franklin, J.D. Powell, and A. Emami-Naeini, *Feedback Control of Dynamic Systems*, Prentice Hall, 6th edition, 2010. (Excellent reference on control systems.)
2. N.S. Nise, *Control Systems Engineering*, Wiley, 3rd edition, 2000.
   (Very readable introduction to control systems with many practical examples.)