

MENGR 3610: Mechanical Measurements Laboratory
University of Detroit Mercy
Term III, 2012-2013

Course Description: An extensive set of laboratory experiences to illustrate mechanical measurements and data analysis. Experiments are designed to demonstrate the application of force, temperature, pressure and other transducers. Data acquisition and presentation of data are emphasized.

Prerequisites: ENGR 3120 (Statics) and MATH 4270 (Probability)

Instructor: Dr. Rick Hill, Assistant Professor
Department of Mechanical Engineering
Room E274
hillrc@udmercy.edu

Class meetings: M 9:00-9:54am, Room E120

Laboratory: M 1:30-4:21pm, Room E127

Office hours: M 10:00-11:00am, T 4:21-5:30pm, W 2:00-4:00pm, R 1:30-3:00pm,
others by appointment

Course homepage: <http://knowledge.udmercy.edu>

Required text:

Beckwith, T.G., Marangoni, R.D., and Leinhard, J.H., *Mechanical Measurements*. 6th Ed., Pearson Prentice Hall, 2007.

Grading:

Homework	10%
Laboratories and Lab Reports	50%
Laboratory Practical	5%
Midterm Exam	15%
Final Exam	20%

Grading Scale:

Percentage	93-100	90-92	87-89	83-86	80-82	77-79	73-76	70-72	67-69	60-66	< 60
Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F

Class Policies: Teamwork - Labs will be conducted in teams of two or three students, with each team submitting a single lab report. All team members must participate in producing each lab report. If a team member is not contributing their fair share, the scores may be redistributed among the team members.

Attendance - **There will be no makeup laboratories.** The semester grade will be lowered by 10% for each missed lab. Extenuating circumstances must be discussed on a case-by-case basis. A student missing a laboratory session must review what was done and help prepare and submit a report with a partner who attended the lab session. Arriving late (by any length of time) for lab more than twice will result in a 2% reduction in term grade per late arrival (i.e., three late arrivals is a 6% deduction, 4 is an 8% deduction, etc.).

Assignments - Homework and lab reports are generally (though not always) due one week after being assigned (**at the beginning of class**) and will be graded and returned in one week. Late work is assessed a 10% penalty. Once I finish grading an assignment, I will no longer accept late submissions.

Regrades - If you feel a mistake has been made in the grading of an assignment or exam, you have one week from the date of its return to submit the item for a regrade.

Academic Integrity - Any suspected cheating will be dealt with according to the College policy - see the Engineering Science Student Handbook. In the case of homework, working together is encouraged, but you must write your own solutions that reflect your own understanding of the material. Note that a specialized software program will be employed for checking your lab reports for evidence of plagiarism.

Course Topics:

1. Introduction to data analysis
2. Probability distributions
3. Confidence intervals
4. Propagation of uncertainty
5. Least squares methods and graphical presentation

6. Time dependant data analysis
7. Periodic behavior
8. First and second order response of measurement dynamics
9. Signal conditioning, amplifying and filtering
10. Feedback control

Course Learning Outcomes/Linkage to ME Program Outcomes: After completing this course, students will:

1. Be competent in performing mechanical measurements using various sensors and transducers. [ME Outcome b, and k]
2. Be able to use LabVIEW on a PC for data acquisition and basic control tasks. [ME Outcome b, and k]
3. Be able to analyze data and draw accurate and meaningful conclusions about the data. [ME Outcomes b and m]
4. Be able to present results of a laboratory study in a professional and technically accurate manner. [ME Outcomes b and g]
5. Be able to effectively and efficiently troubleshoot hardware and debug software as related to its use in the laboratories conducted. [ME Outcome k]
6. Be able to work effectively in a small team to accomplish an engineering task. [ME Outcome d]
7. Be able to communicate effectively. [ME Outcome g]