ME 1042: Mechanical Measurements 2

(Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be posted on the course website and announced in class)

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Office Hours: Tuesdays and Thursdays 11:00am-2:00pm

Lecture and Laboratory Times:
Thursdays 2:00pm – 5:00pm, Room 3-113

Catalog Description: 3 Credits; this course is the second in a sequence of courses that pertain to engineering laboratory measurements. This course aims to advance the understanding of measurement systems and analyzing experimental data. Students will test laboratory scaled mechanical engineering systems and apply fundamental knowledge from mechanical engineering topics to analyze and rate those systems. Laboratory exposure is an important component in this course that will help prepare students for future laboratory setting environments.
Prereq: ME 1041

Course Objectives:

- Develop an understanding of a laboratory environment and safe practice techniques.
- Learn how to organize experimental procedure and operate laboratory equipment.
- Become familiar with advanced engineering laboratory tools and how engineering systems are tested.
- Learn how to effectively analyze data sets and apply statistical techniques (i.e. Uncertainty Analysis and Variance).
- Design and implement an experimental approach for hypothesis testing.

Required Text:

Theory and Design for Mechanical Measurements, Figliola and Beasley, 6th edition, Wiley

Course Outline:

Part 1: Dynamics and Controls Labs
Forced and Free Vibrations
Automated Level Control using PLCs
Fundamentals of Feedback Control
PD Control of Unstable Systems
Part 2: Mechanics of Materials Labs
Geared Systems
Fatigue and Failure
Part 3: Thermal Fluids Labs
Bench-top Heat Exchangers
Radiation Heat Transfer

Examination Schedule:

Final Exam	Monday June 10th

Course Grading:

Pre-Lab Assignments	10%
Lab Reports	55%
Lab Notebook	15%
Final Exam	20%

Grading Scale: A 10-point scale will be used as a baseline for final grades (A, A- > 90, 89 > B+, B, B- >80, etc.). An additional curve may be applied, as determined by the overall final grade distribution of the class. Grades of A-, B+, B-, etc. will be determined at the instructor's discretion.

Course Schedule:

Week 1	March 4th	
	Course Introduction	Lab Introduction and Safety
Week 2	March 11th	
	Forced and Free Vibrations	Lab 1
Week 3	March 18th	
	Forced and Free Vibrations	Lab 1
Week 4	March 25th	
	PLC Tank	Lab 2
Week 5	April 1st	
	Control Theory	Lab 3
Week 6	April 8th	
	Feedback Controls	Lab 3
Week 7	April 15th	
	Unstable Systems	Lab 4
Week 8	April 18th	
	Unstable Systems	Lab 5
Week 9	April 22nd	
	Gear Systems	Lab 6
Week 10	April 29th	
	Fracture Mechanics	No Lab
Week 11	May 6th	
	Heat Exchangers	Lab 7
Week 12	May 13th	
	Heat Exchangers	Lab 7
Week 13	May 20th	
	Radiation Heat Transfer	Lab 8
Week 14	May 27th	
	Radiation Heat Transfer	No Lab
Week 15	June 3rd	
	Final Exam Review	No Lab
Week 16	June 10th	
	Final Exam	No Lab

Class Policies: Regular class attendance is expected and encouraged. Each student is responsible for all of the material presented in class and in the reading assignments. Exams will emphasize treatment of material covered in lectures. In general, no late assignments will be accepted or makeup exams given. Exceptions will be made for a valid excuse consistent with University Policy. If you cannot attend an exam or meet a due date, you must contact the instructor prior to the exam or due date. Arrangements will be made for students on a case by case basis. (Failure to contact the instructor prior to the exam or assignment due date will result in a zero on that exam/assignment.)

Laboratory Policies: Students must attend all scheduled labs. Exceptions will be made for a valid excuse consistent with University Policy. If you cannot attend a laboratory, you must contact the instructor prior to the lab session in order to reschedule. While in the laboratory, all safety guidelines and procedures must be followed. Failure to comply with safe laboratory practices will result in removal from the course.

Academic Integrity Policy: "Violations of academic integrity include, but are not limited to, cheating, plagiarism, or misrepresentation in oral or written form. Such violations will be dealt with severely, in accordance with University policy. Plagiarism means representing someone else's idea or writing as if it were your own. If you use someone else's ideas or writing, be sure the source is clearly designated." It is expected that students adhere to the academic integrity policy that is presented in the Student's Honor Code of Conduct / Student Handbook.