

ME 3323 – Solid Mechanics Lab SPRING 2014

CRN: 24307 (M), 24309 (R)

COURSE SYLLABUS

Ricardo Martinez

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Office/Office Hours: TBA

Meeting: For Monday class - 1:30 PM to 4:20 PM at PSYC 307 (lecture)/ENGR 102 (lab)
For Thursday class - 1:30 PM to 4:20 PM at LART 207 (lecture)/ ENGR 102 (lab)

Description: Solid mechanics combines several engineering fundamentals: materials, structures, failure, and vibration analysis. In addition, this course focuses on teaching the process of basic experimentation and analyzing the associated empirical data attained.

Literature: Laboratory manuals and other resources will be posted on Blackboard under the **Content** folder. There is not required textbook, but I will follow Experimental Methods for Engineers, 7ed. by J.P.Holman. The course notes will be sufficiently detailed that a textbook need not be purchased.

Objectives: The general purpose of this course is to strengthen the student's understanding of engineering measurements. Therefore, specific learning objectives for this course are:

1. Practice safety procedures in a laboratory environment.
2. Apply the fundamental equations to engineering measurements.
3. Mathematically assess sources of experimental uncertainty.

Methodically record data, analyze data, and present it in a technical report format.

Overview: This course will provide you with hands-on experience dealing with practical issues in engineering experiments. In this lab, you will learn how to take the basic measurements of well-known phenomenon and analyze data, taking into account various sources of error and uncertainty in the setup.

Topics covered will include reviewing of some of solid mechanic's theory, introduction to fracture mechanics, uncertainty analysis, statistical analysis, and error analysis.

There are six experimental test setups designed to test specific phenomenon. The following experiments listed below will be performed throughout the semester:

Bifilar suspension (1-5), mass - spring systems (1-6), torsional oscillations of a single rotor in viscous damping (1-8), the I-beam in bending (2-2), hollow shaft (tube) analysis (2-3), and energy absorbed at fracture (3-1).

Assignments: Students are expected to read experiment manual before entering the lab. A pre-lab will be available online in **Blackboard** regarding the experiment theory, setup and procedures. They are due at the beginning of the lab and they are per individual.

Experiments will be conducted in teams. **Lab reports will be submitted per student for every experiment conducted.** Submission date of homework and lab reports is the beginning of next lab session. Late submission of a lab report will incur in 30 points (this apply until midnight of that day). Reports will not be accepted after the due date. Any problems incurring to report submission please inform before the deadline. Otherwise may not be considered.

Unless the homework assignment is a technical report, the homeworks will be done on engineering paper, or squared paper, neatly written and with all assumptions detailed. Any graphs or sketches should be done as neatly as possible. Plenty of time is given for the homeworks, so don't leave them until the last minute.

Grading and Academic Dishonesty: I encourage teamwork when doing homeworks if you feel it helps. However, everyone shall turn in their own work and write down the names of all who collaborated. Any suspicion of plagiarism or other academic dishonesty will be directed to the Office of Student Conflict Resolution.

The grades for the class are divided as follow: 60% lab reports, 10% pre-labs, 20% homework, and 10% Final Exam* (optional). A: >90%; B: 89-80%; C: 79-70%; D: 69-60%; F: <59

The grades for the lab reports will be the average among five categories: Interpretation (understanding the physical concepts of the experiments, as well as the objective), technical (explicit governing equations, calculated data, materials references if needed), English, presentation (organization of the paper according to the outline provided), and results.

Safety Requirements: Everyone must wear goggles at all times while an experiment is in progress, you may not remove goggles until all the students have finished the experiments, or when you leave the laboratory. ZERO TOLARANCE for failure to wear eye-gear and closed toe shoes. YOU WILL RECIEVE A ZERO FOR THE LAB REPORT, and PRE-LAB WITH NO MAKEUP for that time.

Calendar

WEEK 1 01/20 – 01/31	M: No Classes – Martin Luther King, Jr. R: Class Syllabus. Class Introduction
WEEK 2 01/27 – 01/31	Class Topics: Experimental Plan, data acquisition, report presentation, and intro to uncertainty analysis and error analysis.
WEEK 3 02/10 – 02/14	Cont. in uncertainty analysis. Statistical analysis: basic statistical calculations 1 st homework due date
WEEK 4 02/17 – 02/21	Statistical analysis: Regression analysis, data distributions, confidence intervals 2 nd homework due date
WEEK 5 02/24 – 02/28	Mechanical principles for experiments: Bifilar suspension (1-5), Mass - spring systems (1-6), Torsional oscillations of a single rotor in viscous damping (1-8) 3 th homework due date
WEEK 6 03/03 – 03/07	Intro to fracture mechanics. Mechanical principles for experiments: The I-beam in bending (2-2), Hollow shaft (tube) analysis (2-3), and Energy absorbed at fracture

	(3-1). 4 th homework due date
WEEK 7 03/10 – 03/14	SPRING BREAK
WEEK 8 03/17 – 03/21	5 th Homework due date. 1 th report due date. Start 2 th experiment
WEEK 9 03/24 – 03/28	2 th report due date. Start 3 th experiment
WEEK 10 03/31 – 04/04	M: No Classes - Cesar Chavez Day observance R: 3 th report due date. Start 4 th experiment
WEEK 11 04/07 – 04/11	M: 3 th report due date. Start 4 th experiment R: 4 th report due date. Start 5 th experiment
WEEK 12 04/14 – 04/18	M: 4 th report due date. Start 5 th experiment R: 5 th report due date. Start 6 th experiment
WEEK 13 04/21 – 04/25	M: 5 th report due date. Start 6 th experiment R: 6 th report due date
WEEK 14 04/28 – 05/02	M: 6 th report due date R: Final Exam on 05/01 during class time.
WEEK 15 05/05 – 05/09	M: Final Exam on 05/05 during class time. R: No classes