

ME -343 MECHANICAL LAB I

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Lectures: Tuesday, 2:30 pm-3:55 pm, MEC214

Labs: Friday, 3:15 pm-5:25 pm, MEC214

Office Hours: Tuesday, 11:30 am-12:30 pm,
Thursday, 2:00 pm-3:00 pm

Objectives of the of Course

- To combine lectures and laboratory practice as introduction to: Experimental methods for engineers
- Key objectives: Basic ME Measurements
 - Speed
 - Temperature
 - Force
 - Flow
 - Control

Objectives of the of Course

- Data Analysis and Conditioning
 - Randomness
 - Sensor characteristics
 - System uncertainty analysis
- Teamwork
- Lab Report Format and Writing

More Objectives

- Enrich foundation of engineering thinking and practice
- Expand engineering communication means
- Expand foundation of engineering knowledge
- Practice new problem solving techniques
- Preparation for advanced ME courses: ME-405 and ME-406

Literature

- Textbook: J. P. Holman Experimental Methods for Engineers, 7th edition, NY, 2001
- Reference: Beckwith, Marangoni and Lienhard, Mechanical Measurements, 5th edition, Addison Wesley 1993
- Reference: R.J. Goldstein, Fluid Mechanics Measurements, Hemisphere Publish. , 1983

Grading Policy

- 55% for 5 lab reports and class attendance
- 15% homework
- 15% Midterm exam
- 15% Final exam

Grading and performance

- Detailed explanation of lab manual, lab rules and requirements posted at: ME home page-undergraduate-ME 343. Print it and have it ready for next class;
- Be ready for the lecture and lab practice (read assigned material prior to class), bring the book and printed material to the class;
- Submit homework and lab reports on time or you loose;
- ME 343 syllabus.

Lab Report Requirements

- Should be written individually
- Submitted on time
- Collaboration through discussion with team members is encouraged but must not write reports together

Homework

- 5 homework's will be given
- Due after 2 weeks
- Late homework accepted for 50% points maximum
- HW will be returned in about one week

Exams

- Midterm: 1.5 hour long (open book and notes)
- Topics: uncertainty analysis, filtration theory and theory of temperature measurement
- Final: 2.5 hour long (open book and notes)
- Topics: strain gage theory, theory of flow measurement, controls, theory of acoustics measurements

Labs: Rotational Speed Measurement and Signal Filtration

- Measure rotational speed (or the angular velocity)
- Filter signals using low and high pass filters

Rotation Speed Measurement

- Digital Tachometer
- DC generator Tachometer
- Stroboscope
- Oscilloscope Direct Measurement
- Lisajou Figures

Filters

- RC Filter gain and phase measurement

Basic Terms

- Readability of an instrument:
 - Indicates the closeness with which the scale of an instrument may be read
- The least count:
 - The smallest difference between two indicators that can be detected on the instrument scale
- The sensibility of an instrument:
 - The ratio of the linear movement of the pointer on an analog instrument to the change of the measured variable causing this motion