20-251-329 FUNDAMENTAL ENGINEERING MEASUREMENTS
WINTER AND SPRING QUARTERS ANNUALLY

Principles of modern computer-based engineering measurements, sensors, data
acquisition systems, signal processing, data storage and display. Experiments.
2 lec., 3 lab.


D. Neebel, J. Blandino, and D. Lawrence, A Survey of Modern Computer-Based
Signal Conditioning & PC-Based Data Acquisition Handbook (IOtech Inc., 1998)

Coordinator: Peter B. Nagy

Goals: To familiarize the student with the fundamental principles of electrical
measurements and computer data acquisition and signal processing techniques.
This course covers most of the basic engineering measurements with special
emphasis on computer-aided methods.

Prerequisite: none

Topics: 1. Basic concepts of engineering measurements (2 hrs)
2. Fundamentals of digital electronics (4 hrs)
3. Computer-based instrumentation, data acquisition (2 hrs)
4. Computer-based signal processing (2 hrs)
5. Data evaluation, correlation estimation, error assessment (2 hrs)
6. Sensors; active and passive transducers (2 hrs)
7. Examples of engineering measurements (4 hrs)
8. Midterm exam (2 hrs)
9. Take home final exam; measurement system and protocol design (n. a.)
Computer Usage: Extensively throughout the laboratory projects

Laboratory Projects: 1. Fundamentals of digital electronics
2. Virtual Bench: use of basic virtual instrumentation
3. D/A and A/D conversion
4. Digital signal processing
5. Displacement, velocity, acceleration measurements
6. Force, torque, work, power measurements
7. Time, frequency, phase angle measurements
8. Pressure, volume, flow rate measurements
9. Temperature measurement

Est. ABET Content: Engineering Science: 2 credits or 67%
Engineering Design: 1 credit or 33%

Grading: 25% final exam (take home, 1 week deadline)
20% midterm (1-hour, open-book)
20% homework (2-3 times, 1 week deadline)
15% mini-project (2-3 times, 1 week deadline)
20% lab reports (2-3 times, 1 week deadline)

Typical point limits: 90 - 100 points A
80 - 89 points B
70 - 79 points C
60 - 69 points D
< 60 points F

Time: lectures on Thursday 2:00-3:15 in Rieveschl 710
labs on Wednesday 3:00-6:00 in Rhodes 702
or Thursday 3:30-7:00 in Rhodes 702

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