ME 451: Introduction to Instrumentation and Measurement Systems (4 credits)

CATALOG DESCRIPTION
Function, operation, and application of common mechanical engineering instruments, measurement principles, and statistical analysis. Major elements of measurement systems, including transduction, signal conditioning, and data recording. Function and operation of digital data acquisition systems.

PREREQUISITES
ENGR 202, ENGR 311, ST 314, ME 316, ME 317, ME 373

INSTRUCTOR
Brian Bay  Dearborn 221D  brian.bay@oregonstate.edu

TEACHING ASSISTANT
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CLASS MEETINGS
Lecture:  Section 001  CRN 54377  Owen 106  Monday and Wednesday  8:00 – 8:50 AM
Labs:  Section 012  CRN 55233  Rogers 330  Tuesday and Thursday  10:00 – 12:00 AM
Section 010  CRN 54378  Rogers 330  Tuesday and Thursday  12:00 – 2:00 PM
Section 011  CRN 54379  Rogers 330  Tuesday and Thursday  2:00 – 4:00 PM

REFERENCES

ELECTRONIC FILE ACCESS
The web URL is http://classes.engr.oregonstate.edu/mime/spring2010/me451-001
The path in unix is /nfs/stak/a2/classes/mime/spring2010/me451-001
The path in windows is \stak.engr.oregonstate.edu\classes\mime\spring2010\me451-001

COURSE LEARNING OUTCOMES
1. Describe the operation of transducers for strain, acceleration, and temperature measurement.
2. Use a digital data acquisition system to collect reliable experimental data for mechanical systems.
3. Write computer programs for digital data acquisition and process control.
4. Apply theoretical analysis of time-varying signals to selection of signal conditioning components.
5. Conduct uncertainty analysis and perform basic statistical treatment of experimental data.
6. Effectively communicate in both written and oral forms the conduct and results of an experiment.

TOPICS (by week)
Weeks 1: Intro to LabVIEW  Introduction to the programming environment with exercises.
Weeks 2,3: Accelerometer lab  Analog signal input, data display and capture, sampling rate, reports.
Weeks 4,5: Strain Gage lab  Multiple channel sampling, shunt calibration, data/theory comparison.
Week 6: Midterm
Weeks 7,8: Motion Control lab  Control signal output, data acquisition and closed-loop feedback.
Weeks 9,10: Imaging lab  Image acquisition and analysis, object identification and location.

GRADING
LabVIEW introduction:  5%
Short Assignments:  10%
Laboratory Reports (4):  70%
Midterm Exam:  15%
STATEMENT REGARDING STUDENTS WITH DISABILITIES

Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through SSD should contact SSD immediately at 737-4098.

LINK TO STATEMENT OF EXPECTATIONS FOR STUDENT CONDUCT

http://oregonstate.edu/admin/stucon/achon.htm