OREGON STATE UNIVERSITY
Department of Mechanical Engineering
Syllabus       Spring 2007

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, ME 311, ME 316, ME 317, ME 373, ST 314

INSTRUCTOR
Brian Bay       office: 221 Dearborn

CLASS MEETINGS
Lecture section meets in Rogers 230. Lab sections meet in Rogers 126.

<table>
<thead>
<tr>
<th>Lecture:</th>
<th>Section 001</th>
<th>CRN 36012</th>
<th>Rogers 230</th>
<th>Monday and Wednesday</th>
<th>9:00 – 9:50 AM</th>
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<tbody>
<tr>
<td>Labs:</td>
<td>Section 010</td>
<td>CRN 37869</td>
<td>Rogers 126</td>
<td>Tuesday and Thursday</td>
<td>10:00 – 12:00 PM</td>
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<td></td>
<td>Section 011</td>
<td>CRN 36013</td>
<td>Rogers 126</td>
<td>Tuesday and Thursday</td>
<td>12:00 – 2:00 PM</td>
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<td></td>
<td>Section 011</td>
<td>CRN 36014</td>
<td>Rogers 126</td>
<td>Tuesday and Thursday</td>
<td>2:00 – 4:00 PM</td>
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TEXTBOOK
Introduction to Engineering Experimentation, 2nd Edition
Anthony J. Wheeler and Ahmed R. Ganji
Pearson Prentice Hall, New Jersey, 2004

ELECTRONIC FILE ACCESS
http://classes.engr.oregonstate.edu/me/spring2007/me451-001
/nfs/stak/a2/classes/me/spring2007/me451-001
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COURSE LEARNING OUTCOMES
Students completing this course will be able to:

1. Describe the operation of transducers for strain, acceleration, pressure, temperature, and fluid flow measurement.
2. Select and assemble the components of basic analog and digital data acquisition systems.
3. Write simple 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.

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, report generation.
Weeks 4,5: Strain Gage lab  Multiple channel sampling, shunt calibration, rigorous data/theory comparison.
Week 6:    Midterm
Weeks 7,8:  Thermocouple lab  Digital signal output, continuous data acquisition with instrument control.
Weeks 9,10: Water Level lab  Image acquisition and analysis, pressure transducers, instrument calibration.
GRADING
LabVIEW introduction: 5%
Laboratory Reports (4): 20% each
Midterm Exam: 15%

Student Conduct: See: http://oregonstate.edu/admin/stucon/regs.htm

Accommodations
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.