Mechanical Engineering Dept. Department

Syllabus
ME 402: Measurements and Control Lab (0-3-1)

Course Catalog Description:

Design of experiments, sensors selection, wiring and calibration, uncertainty analysis, data acquisition, Introduction to LabVIEW software. Measurements of pressure, temperature and flow. Design and implementation of different control actions to electromechanical, fluid and thermal systems. Lab projects include measurements and control of mechanical or thermal systems.

Course Co-requisites:

- ME 401: System Dynamics & Control

Course Objectives:

1. Apply the basic concepts related to design of experiments, including uncertainty analysis
2. Demonstrate the ability to select and interface different components in measuring system for accurate measurements
3. Calibrate different sensors and other related components.
4. Use LabVIEW software to acquire, record, and analyze experimental data, in addition to building controllers.
5. Design and implement different controllers to various mechanical systems
6. Work in teams and practice enhanced report writing and presentation skills

Course Learning Outcomes:

CLO1. Basic concepts related to design of experiments

CLO2. Calibrate different sensors

CLO3. Use LabVIEW software

CLO4. Work in teams

Learning Resources:

- Measurement and Instrumentation: Theory and Application, Alan S. Morris and Reza Langari, Elsevier, 2012
- Theory and Design for Mechanical Measurements, 5th Edition, Richard S. Figliola and Donald E. Beasley, John Wiley & Sons, Inc. 2011.
- Experimental Methods for Engineers, by Holman, J. P., McGraw Hill, 2011.

Lab Assessment Plan:

Assessment Task	Week Due	Weight
Final Exam	15th	15.0%
Homework on Uncertanity analysis	3rd	10.0%
Homework on LabView	5th	10.0%
LabView Project	7th	15.0%
Lab Reports	Weekly	45.0%
Attendance and Participation	Weekly	5.0%

Lab Weekly Schedule:

Week#	Topics
1	Design of experiments and sensors selection
2	Uncertainty analysis
3	Introduction to LabVIEW software
4	Introduction to LabVIEW software (Continue)
5	Measurements of pressure
6	Vibration measurements
7	Vibration measurements (Continue)
8	temperature measurements
9	temperature measurements (Continue)
10	flow measurement
11	Lab projects include measurements and control of mechanical or thermal systems
12	Lab projects include measurements and control of mechanical or thermal systems (Continue)
13	Design and implementation of different control actions to electromechanical, fluid and thermal systems.
14	Design and implementation of different control actions to electromechanical, fluid and thermal systems. (Continue)
15	Design and implementation of different control actions to electromechanical, fluid and thermal systems. (Continue)