Course: ECE 29300 – Measurements and Instrumentation

Cross-listed Course: ME 29300

Type of Course: Required for the CmpE and EE programs

Catalog Description: Introduction to the theory and application of sensors/devices and their instrumentation for measurements problems in engineering and science. Experiments utilizing basic circuits and sensors are preformed. Methods for recording, interpretation and presentation of experimental results are illustrated. Statistic and design of experiments are emphasized.

Credits: 2

Contact Hours: 4

Prerequisite Courses: ECE 20100, COM 11400, ENG W131

Corequisite Courses: None

Prerequisites by Topics: Have practical communicative experiences; Have knowledge of Volt-ampere characteristics for circuit elements, independent and dependent sources, Kirchhoff’s laws and circuit equations, Source transformations, Thevenin’s and Norton’s theorems, superposition, Transient response of RC, RL, and RLC circuits, Sinusoidal steadystate and impedance, instantaneous and average power; Have practice in writing organized, well-developed, researched papers for a variety of purposes and audiences. Some analysis of prose style and structure.

Textbook:
- A.Eroglu, Lecture Notes

Course Objectives: To present the basic concepts and applications of circuits and devices used in Engineering measurements and to help the students use the computer data acquisition and statistical methods to record and process experimental data.

Course Outcomes: Students who successfully complete this course will have demonstrated:
1. An ability to use data acquisition hardware and software to obtain experimental data. (a, b, k)
2. An ability to use statistical methods and computer software to process experimental data. (a, k)
3. An ability to layout, wire and troubleshoot simply electrical circuits and apply circuits laws. (k)
4. An ability to understand the working mechanisms of sensors such as the strain gage, pressure transducer, accelerometer, thermocouple and LVDT. (k)
5. An ability to calibrate instruments or devices used for engineering measurements. (k)
6. An ability to write formal technical report and perform oral presentation to convey engineering message efficiently. (g)
7. An ability to engage in experiment design and execution. (b)

**Lecture Topics**

1. Introduction and basic concepts
2. Statistical analysis
3. Basic electrical devices and computer data acquisition
4. Design of experiments
5. Report writing and presentation
6. Resistance, voltage and current measurements
7. View and computer data acquisition
8. Circuit laws
9. Application of oscilloscope
10. Fluid pressure measurements
11. Temperature measurement
12. Strain measurement
13. Vibration measurement
14. Step response measurement
15. Frequency response measurement
16. Testing and presentation of design of experiments project

**Computer Usage**

Indicate: Medium

**Lab Experience**

Indicate: High

**Design Experience**

Indicate: Medium

**Coordinator**

Abdullah Eroglu, Ph.D.

**Date**

31/3/11