

Course	ME 29300 – Measurements and Instrumentation
Cross-listed Course	ECE 29300 – Measurements and Instrumentation
Type of Course	Required for the ME program
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 performed. Methods for recording, interpretation and presentation of experimental results are illustrated. Statistic and design of experiments are emphasized.
Credits	Lecture 1; Lab 1
Contact Hours	4
Prerequisite Courses	ECE 20100, COM 11400, and 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 steady-state 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	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 an ability to: <ol style="list-style-type: none">1. Use data acquisition hardware and software to obtain experimental data. (3)2. Use statistical methods and computer software to process experimental data. (2,3)

3. Lay out, wire and troubleshoot simple electrical circuits and apply circuit laws. **(1)**
4. Understand the working mechanisms of sensors such as the strain gage, pressure transducer, accelerometer, thermocouple and LVDT. **(1)**
5. Calibrate instruments or devices used for engineering measurements. **(3)**
6. Write formal technical report and perform oral presentation to convey engineering message efficiently. **(4,7)**
7. Engage in experiment design and execution. **(3)**

Student Outcomes addressed by Course Outcomes

1	2	3	4	5	6	7
M	H	H	L			L

H: Highly, M: Moderately, L: Somewhat

Lecture Topics

1. Introduction and basic concepts
2. Statistical analysis
3. Basic electrical devices and computer data acquisition
4. Design of experiment s
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

Medium

Laboratory Experience

High

Design Experience

Medium

Coordinator

Zhuming Bi, Ph.D.

Date

September 5, 2023