



EE341-Sensors and Transducers (Required Course)

Code and Name: EE 341 Sensors and Transducers

Credit Hours: 3 (Lecture: 3, Tutorial: 1)

Textbook []:

- Measurements and Instrumentation Principles, Alan S. Morris, Academic Press, 10th Edition.

Other References:

- D. Patranabis, 'Sensors and Transducers', Prentice Hall of India, 1999.
- E. A. Doebelin, Measurement Systems: Application and Design Mc Graw Hill, New York.
- Website of National Instruments: <http://www.ni.com/en-lb.html>

Course Description:

Principles and operation of sensor devices, Static characteristics, Dynamic characteristics, Variable resistance transducers, Potentiometers, Strain gauge, Strain gauge applications, Thermistor, RTD, Inductive transducers, LVDT, capacitive transducers, thermoelectric transducers, thermocouples, Piezoelectric transducers

Pre-requisites: EE222

Co-requisites: None

Course Learning Outcomes:

With relation to ABET Student Outcomes (SOs: 1-7)

1. Recognize the principle and operation of sensor device, static and Dynamic characteristics of measurement systems. (1)
 2. Recognize and outline strain gauge classification. (1)
 3. subdivide the transducer classification and compare the types. (2)
 4. Explain the techniques used in various variable resistance transducers. (2)
 5. Differentiate the types of capacitive and inductive transducers. (2)
 6. Demonstrate good report writing skills in project for certain type of transducer, graphs and tables. (7)
1. Evaluate the different techniques in sensors and transducers by simulating on software such as Labview. (3)

Topics to be covered:

- Principles and operation of sensor devices: Measurement systems, Definition of sensor devices, Classification and type of sensors, Errors (classifications, sources, quantification), Selection criteria for a sensor.
- Static characteristics and dynamic characteristics of sensors: Static characteristics of sensors Devices, Accuracy, precision, linearity....., Effects of Input and Output impedance, Zero order Sensors, First order Sensors, Second order Sensors.
- Examples of First and second order sensors: Mercury thermometer, Accelerometer, Input Output Transfer function of sensors, Sensors responses.
- Variable resistance transducers; Principle of operation, Construction details, Potentiometer, Ballast circuits, Load cells, Resistance thermometer, Piezoresistive sensors.
- Resistive Strain gauges, Thin Film or Foil Types gauges, Electrical measuring circuits used with Strain Gauges, Wheatstone Bridge circuits.
- Resistance Temperature Transducers, Inductive and Capacitive Transducers, Thermoelectric and Piezoelectric transducers.

Grading Policy:

The grading for the course are 60% coursework and 40% Final Exam. The coursework consists of two Midterm Exams, where each midterm exam is worth 20%. It also includes quizzes, homework, and projects for the remaining 20% that is modified by the course instructor.

