## Measurement and Control Systems Lab.

<b>Course Code:</b>	28615
Credits:	1
<b>Course Type:</b>	Practical
Prerequisites:	-
<b>Corequisite:</b>	Measurement and Control Systems
<b>Course Length:</b>	34 hours

## **Outline**:

- 1) Arduino and Microcontrollers (At least 3 weeks)
- 2) Strain Measurement and Load Cells (Strain Gauges, Bending Moment and Toque Cells, Wheatstone Bridges, Load Cells, and Amplifiers) (1 week)
- 3) Displacement Measurement and Proximity Sensors (Ultrasonic, Infrared, Capacitive, and Inductive Displacement/Proximity Sensors, IMU and Accelerometers) (1 week)
- 4) Rotation Measurement (Tachometer, Incremental and Absolute Encoders) (1 week)
- 5) Temperature Measurement (RTD, Thermistor, Thermocouples, IC sensors) (1 week)
- 6) Measuring Fluid Flow and Fluid Level Control (1 week)
- 7) Pressure Measurement (1 week)
- 8) Introduction to Dimensional Measuring Tools (1 week)

## **References:**

1-Figliola, R. S., & Beasley, D. E. (2014). Theory and design for mechanical measurements. John Wiley & Sons (Main Reference).

2 -Nakra, B. C., & Chaudhry, K. K. (2003). Instrumentation, measurement and analysis. Tata McGraw-Hill Education.

3- رضایی امیرحسین، ذهابی محمدرضا، اندازه گیری الکترونیکی، انتشارات دانش نگار، سال ۱۳۹۳.

4 -Northrop, R. B. (2018). Introduction to instrumentation and measurements. CRC press.

5 -Holman, J. P. (1984). Experimental Methods for Engineers. Mc Graw-Hil.

6- Doebelin, E. O. (1995). Engineering Experimentation. Mc Graw-Hill.