

ME604 Experimental Methods in Thermal Engineering

Credit: 3-0-0-3

Prerequisite:

Students intended for: MS/PhD

Elective or Core: Elective

Semester: Odd/Even

Course content:

- **Fundamentals:** Importance of measurement and experimentation, calibration, uncertainty analysis, error propagation, Gaussian or Normal distribution, confidence level, regression analysis, correlation coefficient, Chi-Square test, zeroth-,first- and second-order systems.
- **Pressure Measurement:** Manometers, bourdon tube pressure gage, diaphragm gage, bellow gage, McLeod gage, Pirani gage and ionization gage.
- **Flow measurement:** Positive displacement flow meters, venture, orifice, impact tube, flow nozzle, sonic nozzle, rotameter, pitot static tube, hot-wire anemometer, laser Doppler anemometer, flow visualization techniques – shadowgraph, Schlieren and interferometer.
- **Temperature measurement:** Hg-in-glass thermometer, RTD, thermistor, thermocouple, thermopile, liquid-crystal thermography, optical pyrometer.
- **Thermal conductivity measurement:** Guarded hot plate apparatus, heat flux meter.
- **Data acquisition and processing:** Signal conditioning, data transmission, storage, A to D and D to A conversion.
- **Designing experiments**

Text & Reference Books:

J. P. Holman, *Experimental Methods for Engineers*, 7th edition, Tata McGraw-Hill 2001.

T.G. Beckwith, J.H. Lienhard V, R. D. Marngoni, *Mechanical Measurements*, 5th edition, Pearson Education, 2010.

E.O. Doebelin, *Measurement systems, Application and Design*, 5th edition, Tata McGraw-Hill, 2008