- **Course Number and Title:** A E 447. Aerofluids Laboratory
- **Catalog Description:** Use of subsonic wind tunnels and other flow to study basic flow phenomena and methods of fluid measurement and visualization.
- **Credit Hours:** 3 Credits (2+3P)
- **Prerequisite(s) / Corequisite(s)**
  Prerequisite(s): M E 345
  Corequisite(s): A E 439
- **Required:** Required for BSAE Degree
- **Course Availability:** Fall and Spring Semesters
- **Instructor (Usual):** Dr. Fangjun Shu (See https://mae.nmsu.edu/people/faculty.html)
- **Textbook:**
  - Textbook: Not Required
  - References:
    1) Rathakrishan, E., Instrumentation, *Measurements, and Experiments in Fluids*, CRC Press, 2007.
    2) Raffel, M., Willert, C., Wereley, S., and Kompenhans, J., *Particle image velocimetry*, 2nd Ed., Springer, 2007
    3) Figliola, R.S., and Beasley, D.E., *Theory and Design for Mechanical Measurements*, John Wiley and Sons, 1991
    4) Holman, J.P., *Experimental Methods for Engineers*, McGraw-Hill, 6th Ed., 2011
- **Course Learning Objectives:**
  <u>After completing this course, a student should be able to:</u>
  1) Design fluid experiments using similarity law.
  2) Design and conduct fluid experiments in low-speed wind tunnel.
  3) Use data acquisition systems to acquire experimental data and conduct data processing.
  4) Understand different flow measurement / visualization techniques.
  5) Use particle image velocimetry for velocity measurement and analysis.
  6) Write professional technical reports.
- **Topics Covered:**
  - Dimensional analysis and modeling: Similarity law, dimensional analysis, non-dimensional parameters.
  - Wind tunnels: Wind tunnel history, layout, flow regime, energy consumption, Re matching, special tunnels.
  - Data acquisition and processing: Sampling theory, data processing and uncertainty analysis.
  - Flow visualization techniques: Smoke, dye, laser induced fluorescence, PSP, TSP, shadowgraph and Schlieren.

- Velocity measurement: Hot wire anemometry, laser Doppler velocimetry, particle image velocimetry.
- Measurement of pressure and temperature.