Course: ME 31900 – Fluid Mechanics Laboratory

Cross-listed Course: CE 31900 – Fluid Mechanics Laboratory

Type of Course: Required for ME program

Catalog Description: Introduction to fluid mechanics laboratory and design of experiments, including experiments on flow patterns, velocity profile in a pipe, draining of a tank, pipe friction, drag forces, boundary-layer studies, falling-ball experiments, and measurement of fluid properties.

Credits: 1

Contact Hours: 3

Prerequisite Courses: ME 29300 and ME 31800

Corequisite Courses: None

Prerequisites by Topics: Measurements and Instrumentation, Fluid Mechanics


Course Objectives: This lab has four objectives: 1) to compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows; 2) to discuss and practice standard measurement techniques of fluid mechanics and their applications; 3) to learn and practice writing technical reports; and 4) to work on small group projects.

Course Outcomes: Students who successfully complete this course will have demonstrated an ability to:

1. Measure fluid pressure and relate it to flow velocity. (6)
2. Demonstrate practical understanding of fluid statics and center of pressure. (6)
3. Demonstrate practical understanding of impact of a jet. (6)
4. Demonstrate practical understanding of the various equations of Bernoulli. (6)
5. Demonstrate practical understanding of friction losses in internal flows. (6)
6. Demonstrate the ability to write clear lab reports, including the use of word processors, graphics packages, and computational software. (3)
7. Be familiar with and be able to characterize flow patterns and regimes. (1)
8. Demonstrate the ability to work in groups on projects/labs that are appropriate to the course. (5)
9. Demonstrate the ability to design an experiment to determine a fluid property or to investigate a fluid mechanics concept. (6)
10. Understand ethical issues and professional conduct associated with engineering research. (4)

Laboratory Topics
1. Design of experiment: Property measurement—viscosity
2. Center of pressure
3. Impact of a jet
4. Pipe flow—determination of friction factor
5. Pipe flow—determination of velocity distribution
6. Bernoulli's equation: Convergent-divergent passage
7. Drag measurement on cylindrical bodies
8. Flow through an orifice
9. Flow through a venturimeter
10. Total and static pressure measurement with a pitot tube
11. Design of experiment: Pressure drop in a heat exchanger

Computer Usage Medium
Laboratory Experience High
Design Experience Medium
Coordinator Don Mueller, Ph.D., P.E.
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