PURDUE UNIVERSITY FORT WAYNE | Department of Civil and Mechanical Engineering

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
Textbook	*Fluid Mechanics Laboratory Manual*, online, current edition.
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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