

<b>Course</b>	CE 31900 – Fluid Mechanics Laboratory
<b>Cross-listed Course</b>	ME 31900 – Fluid Mechanics Laboratory
<b>Type of Course</b>	Required for CE program
<b>Catalog Description</b>	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.
<b>Credits</b>	1
<b>Contact Hours</b>	3
<b>Prerequisite Courses</b>	ME 29300 and ME 31800
<b>Corequisite Courses</b>	None
<b>Prerequisites by Topics</b>	Measurements and Instrumentation, Fluid Mechanics
<b>Textbook</b>	<i>Fluid Mechanics Laboratory Manual</i> , online, current edition.
<b>Course Objectives</b>	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.
<b>Course Outcomes</b>	Students who successfully complete this course will have demonstrated an ability to: <ol style="list-style-type: none"><li>1. Measure fluid pressure and relate it to flow velocity. <b>(6)</b></li><li>2. Demonstrate practical understanding of fluid statics and center of pressure. <b>(6)</b></li><li>3. Demonstrate practical understanding of impact of a jet. <b>(6)</b></li><li>4. Demonstrate practical understanding of the various equations of Bernoulli. <b>(6)</b></li><li>5. Demonstrate practical understanding of friction losses in internal flows. <b>(6)</b></li><li>6. Demonstrate the ability to write clear lab reports, including the use of word processors, graphics packages, and computational software. <b>(3)</b></li></ol>

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**

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**Date**

21 June 2018