

**CIEN 321  
FLUID MECHANICS**

**2002-2004 Catalog Data:** (Credit, 3 Hours ; Required). Prerequisite: MEEN 225 Properties of fluids; fluid statics; kinematics and kinetics of one-dimensional flow; impulse-momentum; dimensional analysis; flow in pipes, channels and porous media. Engineering applications. Flow measuring devices.

**Textbook:** “*Fluid Mechanics*” by Streeter, Wylie and Bedford, 9<sup>th</sup> edition, McGraw Hill.

**References:**

1. J.A. Roberson and C.T. Crowe, *Engineering Fluid Mechanics*, 7<sup>th</sup> Ed., Houghton Mifflin.
2. D.F. Young, B.R. Munson, T.H. Okiishi, *A Brief Introduction to Fluid Mechanics*, 2<sup>nd</sup> Ed., John Wiley & Sons, Inc.

**Course Educational Strategies:**

1. The foundation for the course will be the basic concepts of dynamics/kinetics that were taught in MEEN 225.
2. Interest in the subject will be generated by working practical and realistic problems in the class.
3. Homework and class assignments will be designed to augment the student’s comprehension of the subject matter.
4. The students will be tested for the material that is covered in the classroom and in the homework. The exams will test both the theoretical and problem solving ability of the student.

**Course Objectives:**

1. To give the civil engineering majors knowledge of the fundamental principles of fluid mechanics.
2. To enhance the students’ ability to solve practical fluid mechanics/hydraulic problems.
3. To help the student solve the fluid mechanics problems in the FE exam.

**Course Content:**

1. Fluid Properties (Units, Density, Specific Weight, Specific Gravity, Pressure, Surface Tension, Shear Stress, Viscosity)
2. Fluid Statics (Pressure at a Point, Units and Scales of Pressure, Manometers, Forces on Plane Areas, Forces on Curved Surfaces, Buoyant Forces)
3. Fluid Flow Concepts and Governing Equations (Conservation of Mass/Continuity Equation, The Energy/Bernoulli Equation and Applications, Linear Momentum Equation and Applications)
4. Viscous Flow: Pipes and Channels ( Major Losses, Darcy-Weisbach Equation/Moody Diagram, Minor Losses and Computation)
5. Dimensional Analysis
6. Introduction to Open Channel Flow

**Instructor:** Erat S. Joseph, Ph.D., P.E., Professor  
**Office Location:** Room 312, Pinchback Engr. Bldg.  
**Office Phone:** 225-771-5870, Fax 225-771-4320  
**E-mail:** [joseph@engr.subr.edu](mailto:joseph@engr.subr.edu)

<b>ABET Category Content:</b>	Basic Math/Sciences	0
	Engineering Sciences:	3 credits
	Engineering Design:	0
	General Education:	0

**Prepared by: Dr. Erat Joseph**

**Date: 1/5/2003**

**COURSE ASSESSMENT:**

<b>Course Objectives</b>	<b>Intended Educational Outcomes</b>	<b>Relationships</b>
Objective 1: To introduce the student to the fundamental principles of fluid mechanics.	<ul style="list-style-type: none"><li>• Provide theoretical knowledge of hydraulics/fluid mechanics to students. The topics will include, but not limited to, fluid properties, statics, governing equations, closed and open flow losses and measurement.</li></ul>	Program objectives: 1 & 2  ABET: a & e
Objective 2: To enhance students ability to solve practical fluid mechanics/hydraulic problems.	<ul style="list-style-type: none"><li>• Students will be able to solve problems from: fluid properties, statics, governing equations, dimensional analysis, closed and open flow losses and measurement. Augment the student's engineering ability and to pass FE exam.</li></ul>	Program objectives: 1 & 2  ABET: a & e
To help students solve the fluid mechanics problems in the FE exam	<ul style="list-style-type: none"><li>• Students completing this course will be better prepared to solve fluid mechanics/hydraulic problems in the FE exam. A separate FE – Fluid Mechanics review guide will be made available for students at the end of the semester.</li></ul>	Program objectives: 1 & 2  ABET: a & e