Phys 282/Pgeog 383.38 – Spring 2009  
Introduction to Fluid Mechanics  
3 credits

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General Description: This course covers the basic principles of fluid mechanics at an introductory but detailed level. Topics include statics and kinematics of fluid motion, integral and differential representation of conservation of mass, the first Law of Thermodynamics, Bernoulli’s equation, dimensional analysis, and elementary viscous flow. Frictional losses, simple pipeline analysis and steady channel flow are covered. Understanding of the physical phenomena is stressed and vector notation is used whenever suitable.

This course can serve as the foundation for a series of future courses that involve fluids and that students will encounter in physics, chemistry, environmental studies, biophysics, geosciences (Earth, atmospheric, planetary and oceanic sciences) and most certainly in many of the subdisciplines of engineering (mechanical engineering, civil and environmental engineering, biomedical engineering, to name a few). The subject is fascinating! Examples of the workings of fluid dynamics are all around us: transport of chemical contaminants, heat transfer, biofluids (swimming of fish, flying of birds, thermodynamics of life systems, fluids through the human body – air and blood), climate dynamics, energy from geo-resources, and the list never ends!

With this brief introduction in mind, I would like to offer a few anticipated and desired Course Outcomes:

- To stimulate students’ interest in understanding the complex world of fluids.
- To enable students to view fluids based on physical laws and to analyze fluids’ phenomena using physical laws and mathematics.
- To make students link real fluids with descriptive/analytical work.

Prerequisites: Calculus I and II. Students with one semester of Calculus may be able to take this course while they are taking the second semester of Calculus. Basic physics recommended or/and permission of instructor. Please Note: These are guidelines, when in doubt please contact me. I expect that in class I will go over the math needed in this course and will not let that hamper our progress in understanding basic concepts, working out problems and being able to achieve the objectives of this course.


$138.95 directly from Wiley regular web site can be purchased from Amazon.com for about $60.00 – new – and for less if used.

List of Topics (following Textbook’s Table of Contents): 1. Introduction; 2. Fluid Statics; 3. Elementary Fluid Dynamics — The Bernoulli Equation; 4. Fluid Kinematics; 5. Finite Control

**Guideline for grades**: Grades will be based on two Midterm Exams, Homeworks and Class Participation, and on a third, more comprehensive Exam at the end of the semester.

**Helpful Information**:

**My Teaching Philosophy**: My goal in teaching is to help students in becoming confident and responsible professionals and to make this experience an enjoyable one. My approach to teaching involves being a facilitator in the learning process as opposed to being the authoritarian lecturer at the front of the room with a “one-way information transfer” style. I understand and respect individual differences in learning and do my best to promote learning in the classroom by working with individual differences rather than against them. I expect students to put their best effort in this course. This involves participating in the in-class exercises, reading the assigned material, doing the homework, editing when necessary until they are clear and correct, and preparing for quizzes and exams.

**Lecture**: I will spend part of the lecture time explaining the key concepts of fluid mechanics but devote time to solution of problems. You are expected to devote time outside the classroom to understand the concepts, work out problems and review questions. I expect that lectures will help you solve the problems on the quizzes and exams. I prefer to develop the material of lectures on the blackboard, follow my notes (guided by the textbook for the most part), and the pace at which we cover the material is determined to a large extent by the class; some topics may need more time than others, more explanations and more examples. A detailed tentative schedule of lectures will be provided at the start of the semester.

**Finally**: It is important to start with a good study habit. Consistency is the key. Forming study groups is extremely helpful. Use my office hours and any other resource available to you throughout the semester. Make progress steadily as the material in this course cannot be understood the night before the exam.