CE 360 FLUID MECHANICS
Tu-Th 1-2:15p in 207S Henderson-South

INSTRUCTOR: Dr. Patrick Reed
OFFICE: 215 B Sackett Building
TELEPHONE: 863-2940
EMAIL: preed@engr.psu.edu
OFFICE HOURS: Dr. Reed's---TU 9-11am, TH 9-11am, or by appointment
Lauren Webber (Teaching Intern)---Evening help session(s) TBA.

REQUIRED TEXT: Young et al., *A Brief Introduction to Fluid Mechanics*, 3rd Edition, John Wiley & Sons, Inc., New York, NY, 2004.

GRADING:

Participation	10%
Homework	25%
Midterms (2)	20% each
Final	25%

Letter grades will be based on the weighted average specified above and assigned as follows:

- A = 94-100%
- A- = 90-93%
- B+ = 87-89%
- B = 84-86%
- B- = 80-83%
- C+ = 76-79%
- C = 70-75%
- D = 60-69%
- F < 60%

I reserve the right to adjust your grades. Your grade will only improve if adjustments are necessary. Feel free to contact me during office hours or by appointment if you have grade-related questions or concerns.

COURSE GOALS:

Enable you to understand and apply the fundamental principles governing incompressible fluids to the design of engineering systems. Fluids surround and affect everything in the physical world, consequently every major project you will be participating in as an engineer requires a sound understanding of the material covered in this course. This course represents a stepping stone in your professional development; it is intended to aid you in developing the skills you will need for systematic decomposition and solution of real-world problems.

IN CLASS PARTICIPATION:

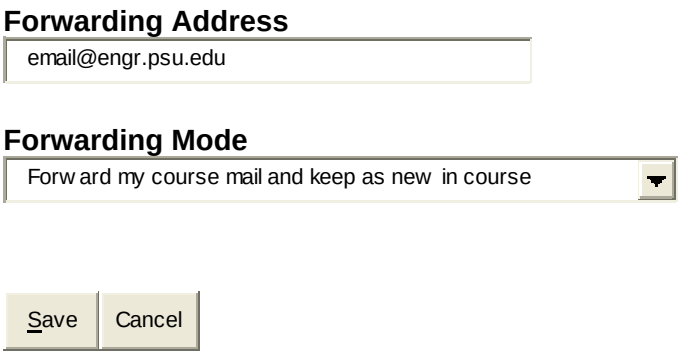
Please bring your text, a calculator, and scrap paper to each class. You will be participating in the solution and discussion of in-class example problems. You will work in small groups while solving these problems. Each group will hand in their attempt to solve the problem with each member's signature on the paper. Simply attempting the solution will result in full participation credit for the day. These in-class exercises will require that you **complete the assigned readings** prior to the beginning of each class.

ON-LINE CLASS PARTICIPATION:

All course emails and web postings will be made using the ANGEL course management software. You will need to regularly login (**https://cms.psu.edu/frameIndex.htm**) to check course announcements, download in-class example solutions, and access posted homework solutions.

Important: When you 1st login into the system you must configure "My Settings" to forward course emails to your primary email account as follows:

Step 1: Login into system
Step 2: Click "My Settings"
Step 3: Click "System Settings"
Step 4: Type your PSU Email under "Forwarding Address" and set "Forwarding Mode" as shown below:



Step 5: Click "Save". You now should receive all course announcements in your primary email account as well as your ANGEL account.

HOMEWORK:

Homework will be assigned weekly and is due at the **beginning of class** on the Thursday of the subsequent week. Late homework **will not** be accepted. Feel free to discuss the homework with your classmates, but your homework solutions **must** be your own.

Each assignment requires:

- Your name on each page of **stapled** solutions
- A legible step-by-step presentation (**in pencil**) of the solutions (**include problem diagrams**)
- Boxed answers presented in proper units

Solutions will be made available after your assignments have been collected.

EXAMS:

Midterms exams will be given in class on the dates listed below. You will be allowed one 8 ½ in. by 11 in. crib sheet. Make up midterm exams will not be given. In extreme cases, an exam grade will be replaced by the average of your grades on the remaining 2 midterms (proof of illness or emergency will be required).

EXTRA CREDIT:

This course introduces you to the importance of fluids. I will increase your score on each homework assignment by 10%, if you find examples in newspapers, magazines, or the internet of real-world problems where the topics covered in this course play a vital role. Submit a 1-paragraph (<300 words), well written synopsis that provides:

- A summary of the problem (in your own words)
- A brief discussion of how the problem relates to this class (what principles covered in class are important in solving the problem?)
- A reference for where you found the story

Essay Competition: I am encouraging you to develop your writing skills and broaden your perspective on the "beauty" of fluid mechanics. To participate in this competition you must write a 5-page essay on Leonardo da Vinci that addresses his role as a Master of Water and how fluid mechanics played a role in both his engineering and artistic accomplishments. The essays need to be researched with citations, well written, and **VERY** original (i.e., they should be informative and fun to read).

The essays must be of very high quality to be considered in the competition. Students with top rated essays will receive 5-percentage points added to their final grade. Any student who submits a high quality essay will receive a minimum of 3-percentage points added to their final grade. I will publish the best essays on the web.

Letters of Commitment are due February 1, 2005 (simply email me stating that you will participate).
Essays are due Friday, April 8, 2005 by 5pm with no exceptions.

ACADEMIC INTEGRITY

The University's statement on academic integrity, from which the following statement is drawn, is available at **http://www.psu.edu/dept/oue/aappm/G-9.html**

Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

All students are expected to act with civility, personal integrity; respect other students' dignity, rights and property; and help create and maintain an environment in which all can succeed through the fruits of their own efforts. An environment of academic integrity is requisite to respect for self and others and a civil community.

Academic integrity includes a commitment to not engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty include cheating or copying, plagiarizing, submitting another persons' work as one's own, using Internet sources without citation, fabricating field data or citations, "ghosting" (taking or having another student take an exam), stealing examinations, tampering with the academic work of another student, facilitating other students' acts of academic dishonesty, etc.

Students charged with a breach of academic integrity will receive due process and, if the charge is found valid, academic sanctions may range, depending on the severity of the offense, from F for the assignment to F for the course.

COURSE SCHEDULE (subject to change, if topics require more lecture time)

WEEK/DATE	TOPIC	LECTURE	READING	HW
1 / Jan. 11	Intro., dimensions, physical properties	1	1.1-1.5	1.2,1.6,1.10
1 / Jan. 13	Viscosity, compressibility, surface tension	2	1.6-1.9	1.19,1.28,1.48
2 / Jan. 18	Fluid statics: governing equation, pressure measurements, hydrostatic distribution	3	2.1-2.4	2.1,2.8
2 / Jan. 20	Fluid statics: manometry	4	2.6-2.7	2.10,2.21,2.20
3 / Jan. 25	Fluid statics: forces on plane surfaces	5	2.8-2.9	2.25, 2.27, 2.30
3 / Jan. 27	Fluid statics: forces on plane surfaces, layered fluids, pressurized surfaces	6	2.8-2.9	2.34,2.36,2.39
4 / Feb. 1	Fluid statics: forces on curved surfaces	7	2.10	2.42,2.44 (not graded)
4 / Feb. 3	Fluid statics: forces on curved surfaces, buoyancy, stability	8	2.10-2.12	2.45,2.46,2.56 (not graded)
5 / Feb. 8	Bernoulli Equation	9	3.1-3.6	TBA
5 / Feb. 10	EXAM 1			
6 / Feb. 15	Bernoulli Equation Applications	10	3.6	TBA
6 / Feb. 17	Hydraulic Grade Line/Review	11	3.7-3.8	TBA
7 / Feb. 22	Energy Equation	12	5.3	TBA
7 / Feb. 24	Fluid kinematics: flow classifications, total derivatives	13	4.1-4.3	TBA
8 / March 1	Fluid kinematics: total derivatives, conservation of mass	14	4.3, 5.1	TBA
8 / March 3	Linear momentum	15	5.2	TBA
9 / March 8	NO CLASS ☺ Spring Break			
9 / March 10	NO CLASS ☺ Spring Break			
10 / March 15	Angular momentum	16	5.2	TBA
10 / March 17	Dimensional Analysis, Buckingham Pi Theorem	17	7.1-7.3	TBA
11 / March 22	Dimensional Analysis modeling and similitude	18	7.4-7.9	TBA
11 / March 24	Viscous flow, boundary layers	19	9.1-9.2	TBA
12 / March 29	Review Day			None
12 / March 31	EXAM 2			
13 / April 5	Boundary layers, characteristics of pipe flow	20	9.2, 8.1	TBA
13 / April 7	Laminar and Turbulent pipe flow (**Late Drop Deadline)**	21	8.2-8.3	TBA
14 / April 12	Turbulent pipe flow, Moody chart	22	8.3-8.4	TBA
14 / April 14	Losses, non-circular conduits, multi-pipe systems	23	8.4-8.6	TBA
15 / April 19	Froude classification, specific energy, Chezy and Manning Equations	24	10.1-10.4	TBA
15 / April 21	Hydraulic jump/ Profile classifications	25	10.6	None
16 / April 26	Extra Credit Essay Contest (???)			None
16 / April 28	Review Day			None