CE 380S – Environmental Fluid Mechanics

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Fall 2006  Office: ECJ 8.208
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Tues/Thurs 2:00-3:15  ECJ 5.416  (please include CE380S in subject line)

Office Hours (ECJ 8.208)
Tues: 3:30 – 4:30 pm;  Thurs: 10:30 am – 11:30;  other times by appointment

Availability on Monday, Wednesday, Friday: On these days, I am generally at the UT Pickle Research Campus, CRWR, Building 119. I can usually meet with you about class out there, however, if you are making a trip to CRWR to visit me it is best to make an appointment by phone or email.

Class web site:  https://webspace.utexas.edu/hodgesbr/ce380s/
N.B. you must first login to UT webspace with your UT EID at https://webspace.utexas.edu before you can access the course web site above. The normal UT EID login page cannot be substituted for the webspace login. The UT webspace appears to have occasional hiccups and returns “page not found”. When this happens, try refreshing your browser several times.

Exam dates: There will be no exams in this class. Grading will be based on homework assignments, written project, final presentation, and participation in class discussions.

Final written project and presentation: Students will choose an interesting issue of EFM that is of current interest. They will research at least 3 related journal papers on the subject and write a report that explains the fluid mechanics of the problem and provides linkages between the findings in the papers. The students will also prepare a 30 minute lecture that they will present to the class in one of the last five class periods. The lectures may use powerpoint for detailed graphics that provide insight, but the basic fluid mechanics must be explained to the class using equations on the whiteboard.

Theme: This course is focused on applications of fluid mechanics that provide insight into the physics and transport in environmental systems. Over the course of the term, students will work through state-of-the-art journal articles on EFM problems and will learn the fundamentals of advection, diffusion, turbulence and mixing in stratified natural systems. Lakes, rivers and estuaries will be used as example environmental systems, which will be used to motivate investigations into fluid mechanics processes such as turbulence, internal waves, plumes, jets and convective mixing. The methodology emphasizes use of scaling analyses and balance arguments to reduce the Navier-Stokes equations to first-order balancing of key processes.

Objectives: The course is designed to guide students through learning:
1) the qualitative descriptions of environmental flows
2) an introduction to the jargon of EFM research and turbulence
3) scaling analysis as a tool for understanding environmental systems
4) basic processes that control different typical EFM flows

Scope of course within the graduate curriculum: This is not a substitute for a graduate-level incompressible flow course (e.g. ME 381P) that teaches the fundamentals of fluid dynamics and solutions for the basic equations. This course is designed without a graduate-level prerequisite by approaching environmental fluid mechanics using both a top-down approach (starting from the system level) and a bottom-up approach (starting from fundamental equations). Students who are interested in more detailed study of fluid mechanics are encouraged to take ME 381P as a complement to this course. Within the EWRE curriculum, CE 397, Computational Environmental Fluid Mechanics (taught in the spring of even years), is a natural follow-on to this course for students interested in EFM.

Prerequisites: Elementary Fluid Mechanics CE 319F, or the equivalent.

Textbooks: Recommended: Fluid Mechanics, Pijush K. Kundu and Ira M. Cohen, Elsevier, 2004 (any graduate-level fluid mechanics textbook may be substituted).
Web site: Web-based, password-protected class sites will be associated with all academic courses taught at the University. Syllabi, handouts, assignments and other resources are types of information that may be available within these sites. Site activities could include exchanging email, engaging in class discussions and chats, and exchanging files. In addition, electronic class rosters will be a component of the sites. Students who do not want their names included in these electronic class rosters must restrict their directory information in the Office of the Registrar, Main Building, Room 1. For information on restricting directory information, see the Undergraduate Catalog or go to: http://www.utexas.edu/student/registrar/catalogs/gi00-01/app/appc09.html.

This class will use the UT Webspace for dissemination of information from the professor.

Course drop date: College of Engineering policy for graduate students is as follows: From the 1st through the 4th class day, graduate students can drop or add a course on Rose or TEX. Beginning with the 5th class day, graduate students must initiate any adds or drops in their department. Graduate students can drop a class until the last class day with permission from the departmental Graduate Advisor and the Dean. Graduate students with GRA/TA/Grader positions or with Fellowships may not drop below 9 hours in a long session.

Attendance: Class attendance is strongly encouraged. Students who do not attend class will find the professor less willing to spend extra time outside of class.

Homework Policies: Homework will be assigned for each major subject area. Students must submit their original solutions to homework assignments at the beginning of class on the assigned due date. Solutions will be available on the UT web space. It is important that the student’s homework is neat enough to read and follow – the professor will not grade homework that is not neat and clear. This latter check is inherently subjective – however, as professionals you must be able to write neat solutions to problems that can be understood.

Cooperation on homework assignments
Students may work together on homework assignments; however, each student must turn in an original homework.

Late homework
Late homework will generally not be accepted without prior notification of exceptional circumstances.

Grading Policies: Grades will be based on a standard scale of 93-100 = A; 90-92 = A-; 87-89 = B+; 83-86 = B; 80-82 = B-; 70-79 = C; 60-69 = D; below 60 = failing. Homework assignments constitute 30% of the final grade. The written project will be 40% of the final grade. The class presentation will be 30% of the final grade.

Effect of class participation: Class participation, including attendance and asking questions, is strongly encouraged. The instructor reserves the right to add up to 5 points to a final grade for class participation. Students should not count on obtaining these points in their final grade without showing significant effort in class.

Course/Instructor Evaluation Plan: Course/instructor evaluation forms will be distributed during one of the final lecture periods. A student within the class will be asked to distribute and collect the evaluation forms, and to return them to the Department of Civil Engineering main office on the 4th floor of ECJ Hall.

Scholastic dishonesty: Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including the possibility of failure in the course and/or dismissal from the University. Since such dishonesty harms the individual, all students, and the integrity of the University, policies on scholastic dishonesty will be strictly enforced. For further information, visit the Student Judicial Services web site http://deanofstudents.utexas.edu/sjs/

Students with disabilities: The University of Texas at Austin provides, upon request, appropriate academic adjustments for qualified students with disabilities. Any student with a documented disability (physical or cognitive) who requires academic accommodations should contact the Services for Students with Disabilities area of the Office of the Dean of Students at 471-6259 as soon as possible to request an official letter outlining authorized accommodations. For more information, contact that Office, or TTY at 471-4641, or the College of Engineering Director of Students with Disabilities at 471-4321.