CVEN311-502 Fluid Dynamics
Spring 2011
Dr. James M. Kaihatu
Coastal and Ocean Engineering Division
Zachry Department of Civil Engineering
Instructor and TA Information

- Instructor: Dr. James M. Kaihatu
  - Office: CE/TTI Bldg, Rm 808D
  - Phone: 979-862-3511
  - Email: jkaihatu@civil.tamu.edu
    - Allow 48 hours for response
  - Web: http://ceprofs.civil.tamu.edu/jkaihatu
  - Office hours: MW 10am-12pm or by appointment

- TA: Ms. Allison Guettner
  - Office: WERC 205X
  - Email: allison.guettner@tamu.edu
  - Office hours: TR 1100-1200
Course Description

• Will learn about:
  – Properties of fluids
  – Fluid statics and kinematics
  – Basic conservation principles of:
    • Continuity
    • Momentum
    • Energy
  – Similitude and hydraulic models
  – Incompressible flow in pipes
  – Fluid dynamic drag
Course Description


- **Prerequisites:** CVEN302 or registration therein; MATH251 and CVEN221

- **Course website:**
  - [http://ceprofs.civil.tamu.edu/jkaihatu/teaching/cven311/index.html](http://ceprofs.civil.tamu.edu/jkaihatu/teaching/cven311/index.html)
  - Will be password-protected
  - Announcements concerning the class will be posted on web page – check it regularly
Grading Policy

• Homework: 5%
• Quizzes: 20%
• Exam 1 (28 Feb 2011 7pm-8:40pm): 20%
• Exam 2 (12 Apr 2011 7pm-8:40pm): 25%
• Final Exam (6 May 2011 12:30pm-2:30pm): 30%

• **Regrading**: Requests for regrading homeworks, quizzes or exams must be made within one week of the exam, quiz or homework being returned (read syllabus for further stipulations)
Ground Rules

• Homework: Due at **beginning** of class on due date
  – Generally assigned on Thursdays, due following Thursday
  – *Not all homework problems will be graded*
  – No late homework will be accepted
  – Valid university excuse: notify instructors in advance (except in case of valid emergencies)
  – Students may work together, but blind copying will receive zero credit
Ground Rules

• Quizzes
  – In-class closed-book quiz every Thursday
  – Single problem very close (if not identical) to problem on homework
  – *Lowest quiz score will be dropped*
    • Allows missed quiz for unforeseen circumstances
  – Further missed quizzes without University excuse will result in a zero
Ground Rules

• Exams
  – Two 100-minute evening exams and a final exam scheduled
  – Unexcused absences will receive a zero
  – All exams closed book and closed notes
  – One single-sided 8 ½” x 11” sheet of formulas and notes allowed
    • No examples, problems or solutions are allowed on sheet
    • Sheet will be handed in along with exam
  – Bring calculator, sufficient paper and writing implements to exam
  – Make sure your calculator works!

This is my calculator: HP42S bought in 1989. Uses RPN notation (no “equal” sign)
Why Study Fluid Mechanics?
Dams and Levees

Devil’s Gate Dam, near Los Angeles, CA

Levee break at Inner Harbor Navigational Canal, New Orleans, LA
Pipe Flow (Water, Oil, Gas, etc)

Part of Alaska Oil Pipeline

Storm Drain

Sewage Treatment Plant in West Virginia

Natural Gas Pipeline Network in Kazakhstan

Water Supply Treatment Plant
Hydraulic Engineering

Open channel in the Netherlands

Fishery weir in Georgia

Open channel spillway, Shasta Dam, CA

Hydraulic jump, West Virginia
Coastal and Ocean Engineering

Breaking wave in lab

Tsunami damage, Thailand

NDBC buoy

Oil rig damage after Hurricane Katrina, Alabama

Prediction of nearshore waveheights and currents, Duck, NC
Naval Architecture

Bad naval architecture – The Vasa, Sweden, 1628

Good naval architecture – USS John C. Stennis, Pacific Ocean

Bathyscaphe

Submarine
Laboratory Studies

Barber's Point, Hawaii

Barber’s Point model, Vicksburg MS

Ship model test, NRC, Canada

Wave basin, Hinsdale Lab, Oregon State University, Corvallis OR
Aerospace and Automotive Design

Testing of Lance Armstrong’s Trek Medone (done at TAMU!)

Testing of race-modified Corvette

Testing of full scale fighter jet

Testing of Audi Sports Wagon
Sports!

Drew Brees

Roger Federer

Wayne Gretzky

Catriona LeMay Doan

Jan-Ove Waldner

Some brave dude

Tiger Woods

Cliff Lee
Weather!

My last house

Hurricane Katrina, August 29 2005

Pressure field over continental US

Flood in Germany

Surfside

Galveston Boat Basin

Rollover Pass

Tornado in Iowa
Beverages!

Why do bubbles rise? Why do they increase in size and speed as they rise?

If ice stays fast to bottom of glass when you fill it with water, and you jar the ice loose, what happens to water level in glass?