Course Syllabus for ME 520, Advanced Fluid Mechanics I, Fall 2008

Prerequisites: an undergraduate course in fluid mechanics, vector calculus!

Room/Time: 2211 GGBL, 10:30-noon, Tuesdays & Thursdays

Instructor: David R. Dowling, Professor
drd@umich.edu
2212 G.G. Brown Laboratory (734) 936-0423
Office hours: Tuesdays and Wednesdays 3-5 PM

Objective: Prepare the participants for research and engineering involving fluid mechanics.


References:
- M. C. Potter, and J. F. Foss, Fluid Mechanics, (Great Lakes Press, 1982).
- M. Van Dyke, An Album of Fluid Motion, (Parabolic Press, 1982).

Website: Available to class participants at: https://ctools.umich.edu/portal

Grading:
- HW (20%) Due at lecture on Thursday, 12 assignments, 11 required
- Midterm #1 (20%) Thursday, October 9, 2008, at regular lecture time
- Midterm #2 (20%) Tuesday, November 25, 2008, at regular lecture time
- Final (40%) Tuesday, December 16, 2008, 4:00 – 6:00 PM.

Rules:
- Make-up exams will not be given.
- One book, a dictionary, a calculator, class notes, HW, HW solutions, and a crib sheet may be used on the exams (no other devices, books, or materials allowed).
- Bluebooks are required for all exams.
- The UM CoE honor code will be in effect throughout the course.
- Written regrading requests will be accepted up to one week after exams and homeworks are returned.
- Intellectual collaboration on homework is encouraged. Outright copying is not.
- Lecture notes will not be provided to individual students by the instructor.
- All dates and times listed above are subject to change based on a vote of the class and the availability of resources.

Outline:
- Topic
  I. Introduction & Background (1 week, Ch. 1, 2, 3 + handouts)
    math tools, vector-derivatives, notation, continuum approx., kinematics
  II. Conservation Laws (6 weeks, Ch. 4, 8 + handouts)
    dimensional analysis, control volumes, differential equations
  III. Perfect Incompressible Fluid Flow (2 weeks, Ch. 6 + handouts)
  IV. Viscous Incompressible Fluid Flow (3 weeks, Ch. 9, 10)
  V. Turbulent Flow (2 weeks, Ch. 13)