ME 303: Fluid Mechanics
MW 10 AM-12 PM PHO 202
Discussion Friday 12-1 PM PHO 211

Instructor: Dr. Tyrone M. Porter
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Required Textbook/Coursewebsite:
Munson, Young, Okiishi, Heubsch. *Fundamentals of Fluid Mechanics*, John Wiley and Sons, Inc., custom edition (available at bookstore)

Student Companion Site:
http://bcs.wiley.com/he-bcs/Books?action=index&itemId=0470262842&bcsId=4532

Supplemental Textbook
Cenegal, Cimbala. *Fluid Mechanics: Fundamentals and Applications*, McGraw Hill, 2nd ed.

Course Learning Objectives:
- Develop the ability to describe a fluid qualitatively and quantitatively
- Develop the ability to analyze a fluid under static and kinetic conditions
- Develop insight into how fluids flow close to and far from boundaries
- Gain an appreciation for the value of using experimental methods to measure fluid properties and characterizing fluid flow/behavior through dimensional analysis and lab-based experiments
- Gain experience in writing technical reports on lab-based experiments
- Gain insight into the application of fluid mechanics to practical problems in a variety of disciplines, including aerospace, mechanical, and biomedical engineering

Grading:
Assignments and Quizzes: 20% (quiz given weekly)
Laboratories: 30% (3 lab reports)
10% deduction for not making own measurements
15% deduction each day lab report is submitted late
Exams: 25% per exam (Midterm and Final)
Note: Grading is done on a standard scale…no curve is utilized!

Assignments:
Problems will be assigned and solutions made available on Blackboard. Problems will not be graded; however, you should complete the problems in order to acquire a more thorough

understanding of the concepts and to practice organizing your solutions. The problems and lectures will serve as the basis for quizzes to be given the week after the problems are assigned.

Schedule of lab sessions
The GTF and I will work with you to schedule your labs. Lab manuals and example lab reports will be made available on the Blackboard site.

Lecture	Required Reading	Topic
1	Fluid Properties: Sec. 1-4	Course introduction, historical perspective, and fluid properties
2	Fluid Properties: Sec. 5-9	Fluid properties
3	Dimensional Analysis: Sec. 1-4	Dimensional Analysis: Buckingham Pi Theorem
4	Dimensional Analysis: Sec. 5-9	Inspection method, modeling & similitude
5	Dimensional Analysis: Sec. 5-9 Fluid Statics: 1-3	Modeling & similitude Pressure at a point/spatial variation of pressure
6	Fluid Statics: Sec. 1-6	Hydrostatic pressure, Manometry
7	Fluid Statics: Sec. 6-8	Manometry, Hydrostatic force on planar surface
8	Fluid Statics: Sec. 8	Bernoulli equation, Total pressure
9	Fluid Dynamics: Sec. 6-8	Use of Bernoulli Equation & Limitations
10	Fluid Kinematics: Sec. 1-2	Velocity and acceleration fields; material derivative
11	Fluid Kinematics: Sec. 3-4	Control Volume Reynolds Transport Theorem
12	Finite CV Analysis: Sec. 1	Conservation of mass
13	Finite CV Analysis: Sec. 1	Conservation of mass
14	Midterm review	
15	Midterm exam	3/20/2013
16	Finite CV Analysis: Sec. 2	Linear momentum
17	Finite CV Analysis: Sec 2	Linear momentum
18	Finite CV Analysis: Sec. 3	Energy Equation
19	Finite CV Analysis: Sec. 3	Energy Equation
20	Differential Analysis: Sec. 4	Inviscid Fluid: Euler's Equations of Motion
21	Differential Analysis: Sec. 8	Viscous Fluid: Navier-Stokes Equations of Motion
22	Internal Flow: Sec. 1-2	Fully developed laminar flow
23	Internal Flow: Sec. 3-4	Fully developed turbulent flow, Major losses
24	Internal Flow: Sec. 4	Major & minor losses
25	External Flow: Sec. 1-2	External flow, in general; boundary layer
26	External Flow Sec. 2-3	Drag
27	External Flow: Sec. 3-4	Lift
TBD	Final Exam Period	