ME 303: Fluid Mechanics
Sections - A1: MW 10 AM-12 PM PHO 205
A2: TTH 12-2 PM PHO 203

Instructor: Dr. Tyrone M. Porter
Office: ENG 319
Office Hour: M 5-6 pm, F 3-4 pm, or by appointment
Email: tmp@bu.edu

Graduate Teaching Fellows

Name: Eric Falde (falde@bu.edu)
Office: Ingalls
Office Hours: Th 4-6 pm

Name: Quan Xie
Office: ENG 117
Office Hours: W 9-11 am

Required Textbook/Coursewebsite:
Munson, Young, Okiishi, Heubsch. *Fundamentals of Fluid Mechanics*, John Wiley and Sons, Inc., custom edition

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%
Exams: 25% per exam (Midterm and Final)

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
Dates for lab sessions will be announced on Blackboard. Due to limited space, you may have to complete your labs in groups. In these cases, a timesheet will be made available for students to schedule a time to complete the lab.

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	Fluid Statics: Sec. 1-6	Spatial variation of pressure, Manometry
6	Fluid Statics: Sec. 6-8	Manometry, Hydrostatic force on surfaces
7	Fluid Dynamics: Sec. 1-5	Bernoulli equation, Total pressure
8	Fluid Dynamics: Sec. 6-8	Use of Bernoulli Equation & Limitations
9	Fluid Kinematics: Sec. 1-2	Velocity and acceleration fields; material derivative
10	Fluid Kinematics: Sec. 3-4	Control Volume Reynolds Transport Theorem
11	Finite CV Analysis: Sec. 1	Conservation of mass
12	Finite CV Analysis: Sec. 1-2	Conservation of mass; Linear Momentum
13	Finite CV Analysis: Sec. 2	Linear Momentum
14	Finite CV Analysis: Sec. 2-3	Linear momentum; Energy equation
15	Finite CV Analysis: Sec 3	Energy equation; Review
16		Midterm Examination
17	Differential Analysis: Sec. 1-3	Field descriptions; Conservation of mass, linear momentum
18	Differential Analysis: Sec. 4	Inviscid Fluid: Euler's Equations of Motion
19	Differential Analysis: Sec. 8	Viscous Fluid: Navier-Stokes Equations of Motion
20	Internal Flow: Sec. 1-2	Fully developed laminar flow
21	Internal Flow: Sec. 3-4	Fully developed turbulent flow, Major losses
22	Internal Flow: Sec. 4	Major & minor losses
23	Internal Flow: Sec. 5	Pipe flow examples
24	External Flow: Sec. 1-2	External flow, in general; boundary layer
25	External Flow Sec. 2-3	Boundary layer; Drag
26	External Flow: Sec. 3-4	Drag and Lift
27	External Flow: Sec. 4	Lift; Final Review
TBD	Final Exam Period	