

ENGR 3160 Fluid Mechanics, 3Hrs

Biological and Agricultural Engineering

Instructor

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Course Prerequisite and Co-requisites

ENGR 2120 Statics, ENGR 2700 Differential Equations

Please note that a C or better in ENGR 3160 is a prerequisite for all upper level engineering courses.

Text

Cimbala and Cengel, Essentials of Fluid Mechanics: Fundamentals and Applications, McGraw Hill, New York

Grading Scheme

+/- point scale A(100-95); A⁻ (94-90); B⁺(89-85); B(84-80); C(79-75); C⁻(74-70); D(69-60)
Three Major Tests: 45%
Homework: 10%
Labs and Report 20%
Comprehensive Final 25%

Test Format: Closed Book, Closed Notes, 1 Equation Sheet

Late Homework: One day late –10 points, > one day, no points

General Instructions

- Homework will be assigned, but taken up at the instructors discretion
- The solution method and presentation is equally important as the final answer
- Make every attempt to solve the problem on your own before seeking assistance
- Note: All lab periods and tests will be assigned in class by the instructor
- Note: All topics and lab periods noted below are tentative

Expectations:

1. For every 1 hour in class or lab, 3-4 hours outside class
2. Review background material
 - Units and gravitational constants
 - Integration, Derivatives, and Partial Derivatives

- Statistics – Measures of error and Student t-test
3. Data Analysis Skills
 - a. Linear Interpolation/Extrapolation
 - b. Curve Fitting
 - Linear Regression ($y=mx+b$)
 - Curve Fitting
 1. Non-linear Regression
 - a. Exponential Function ($y=ae^{bx}$ or $\ln y = \ln a + bx$)
 - b. Power Law ($y = a x^b$ or $\ln y = \ln a + b \ln x$)
4. Calculator Use – Conversions, Linear and Non-Linear Regression, Equation Solver
5. Read and comprehend material in the book not covered in lectures
6. Supplement notes from the book
7. Work independently on homework, lab reports, and tests. All students will follow the Academic Honesty Policy at UGA - <http://www.uga.edu/honesty/index.html>

"I will be academically honest in all of my academic work and will not tolerate academic dishonesty of others." - UGA Student Honor Code

8. All students are requested to act in a professional manner – view this class as your first day starting a new job.

Engineering Professionalism

Engineers make great contributions to society. Engineering is a very satisfying profession that provides many rewards but is demanding and requires hard work. The engineering profession is governed by a code of ethics. Engineering faculty at the University of Georgia expect students to act in a professional manner at all times and develop the work ethics required for a successful engineering career. Engineering students at the University of Georgia are responsible for maintaining the highest standards of professionalism and professional practice.

Fluid Mechanics

Period No.	2008	Topic	Reading Assignment
1		Fluid Characteristics, Units, Fluid Measurement	Chapter 1
2		Ideal Gas Law, Data Analysis	Chapter 1
3		Viscosity	Chapter 1
4		Compressibility	Chapter 1
5		Vapor Pressure, Surface Tension	Chapter 1
6		Fluid Statics – Pressure Field Equation	Chapter 2
7		Fluid Statics, Lab #1 – Viscosity Measurement	Chapter 1, 2
8		Pressure Field Equation	Chapter 2
9		Pressure Field Equation	Chapter 2
10		Pressure Measurement	Chapter 2
11		Pressure Measurement, Hydrostatics	Chapter 2
12		Hydrostatics, Lab #2 – Pressure Measurement	Chapter 2
13		Hydrostatics	Chapter 2
14		Exam	
15		Control Volume, Reynolds Transport Theorem	Chapter 1,5
16		Conservation of Mass	Chapter 5
17		Conservation of Mass	Chapter 5
18		Fluid Dynamics – Bernoulli Equation	Chapter 5
19		Fluid Dynamics – Bernoulli Equation	Chapter 5
20		Lab #3 – Velocity Profile	
21		Fluid Dynamics – Bernoulli Equation	Chapter 5
22		Fluid Dynamics – Bernoulli Equation	Chapter 5
23		Fluid Dynamics – Bernoulli Equation	Chapter 5
24		Exam	
25		Mechanical Energy Equation	Chapter 5
26		Mechanical Energy Equation	Chapter 5
27		Momentum Equations	Chapter 6
28		Momentum Equations	Chapter 6
29		Shell Balances – Momentum Balance (Differential Control Volume)	Chapter 9
30		Differential Analysis of Fluid Flow	Chapter 9
31		Differential Analysis of Fluid Flow	Chapter 9
32		Differential Analysis of Fluid Flow	Chapter 9
33		Similitude, Dimensional Analysis	Chapter 7
35		Similitude, Dimensional Analysis	Chapter 7
36		Similitude, Dimensional Analysis	Chapter 7
37		Pipe Flow	Chapter 8
38		Pipe Flow	Chapter 8
39		Pipe Flow	Chapter 8
40		Exam	Chapter 8
41		Pipe Flow – Lab #4	Chapter 8
42		Pipe Flow/Pump Design	Chapter 8/12
43		Pump Design	Chapter 12
44		Pump Design	Chapter 12
45		Open Channel Flow	Chapter 11
46		Open Channel Flow	Chapter 11