ME 106 FLUID MECHANICS - Lec. 1 **Spring 2015, CC#55352**

Instructor: R. W. YEUNG Lectures: MWF 1-2, 105 NorthGate
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Office Hours: M3-4:30, **W3:30-5:30** GSI-Office Hours: Tu3:30-5:30, W12-1,2-3, Th2-4
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Schedule Updated 2/28/2015

Wk	date	Topics	Reading	HW# (Text-book problems) @DUE date
1	1/21	Introduction, Fluid characteristics	1.1-1.4	
	1/23	Ideal gas law, Viscosity, Compressibility	1.5-1.9	HW0: 1.3, 1.9, 1.25, 1.36, 1.65 (self-grading, due 1/26)
	1/26	Surface tension. Pressure,	1.10-2.3	
2	1/28	Hydrostatics, Manometry	2.4-2.7	
	1/30	Force on surfaces	2.8-2.10	HW1: 1.75, 1.87,1.103, 2.27, 2.57, **1***
	2/2	Buoyancy, Rigid-body motion	2.10-11	
3	2/4	Flow along a streamline	3.1-5	
	2/6	Bernoulli's equation	3.6	HW2: 2.69, 2.73**, 2*,** 3.8, 3.14,
	2/9	Bernoulli's equation - applications	3.6-3.81	
4	2/11	Velocity field	4.1	
	2/13	Material acceleration	4.2	HW3: 3.41, 3.48, 3.52, 3.102, **3***
	2/16	President's Day Holiday		
5	2/18	System, Control volume	4.3, 4	
	2/20	Transport theorem	4.4	HW4: 3.98, 4.17, 4.38, 4.67, **4***
	2/23	Midterm Quiz 1	Ch 1-4.2	
6	2/25	Conservation of mass	5.1	
	2/27	Linear momentum	5.2	HW5: 4.31, 4.55, 5.3, 5.4, 5*
	3/2	Control-volume applications	5.2	
7	3/4	Moment of momentum,	5.2.3	
	3/6	Examples, Energy	5.3	HW6: 5.7, 5.21, 5.50, 5.61, 6*
	3/09	Differential kinematics	6.1	
8	3/11	Continuity equation	6.1-2	
	3/13	Stress, Linear momentum	6.3	HW7: 5.67, 5.129, 5.114, 5.127, 7*
	3/16	Momentum equations	6.3	
9	3/18	Inviscid fluid, Potential flow	6.4	
	3/20	Potential flow, examples	6.5-7	HW8: 6.14, 6.24, 6.58, 6.59, 8*
10	3/23-29	Spring Recess		
	3/30	Viscous-fluid Flow	6.8	
11	4/1	Viscous-fluid Flow	6.9	
	4/3	Dimensional Analysis, Pi Theorem,	7.1-7-5	HW9: 6.73, 6.94, 6.97, 6.103, 9*

12	4/6	Similitude analysis	7.6-7.9	
	4/8	Pipe Flow	8.1,2	
	4/10	Turbulent flow	8.2	HW10:
13	4/13	Turbulent flow, Flow losses	8.3,4	
	4/15	Midterm Quiz 2	Ch 4.2-6.9	
	4/17	Engineering Examples	8.5	HW11:
14	4/20	External Flow	9.1	
	4/22	Boundary Layer	9.2	
	4/24	Boundary Layer	9.2	HW12:
15	4/27	Drag & Lift	9.3,4	
	4/29	Ideal Gas,	11.1	
	5/1	Speed of Sound	11.2	HW13:
16	5/4	RRR Week *Isentropic gas flow*	*11.3*	
	5/6	*Compressible flow (Optional)/Review*	*11.4*	
	5/8	*Compressible flow (Optional)/Review*	*11.4*	*HW14:*

May 12, Tuesday, 8-11am, FINAL EXAMINATION on Chapters 5,6,7,8,9,11

5/15, Semester ends

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COURSE

You are expected to be proficient in the fundamentals of solid mechanics (MEC85) or equivalent. Mechanics II (Dynamics) ME104 is not required and can be taken concurrently. You are also expected to be prepared in mathematics at the level of Math 53 and 54, or equivalent. In particular, you should be comfortable with vector calculus and differential equations.

You are expected to attend both lectures and discussion sections. If you miss important announcements, it is your responsibility to obtain the missed information from your classmates, or the course web page (bcourse) if appropriate.

A computer account will be set up for each student in the 2nd floor Etcheverry Hall facilities: Room 2107 Standard software of Excel, Matlab, Fortran are available to you to do the homework problems. For most cases, your own labtop computer will be adequate. The course is not tied to any specific software usage.

We will cover the following topics: fluid properties, hydrostatics, balance equations, analytical description of simple flows, flow measurement, empirical description of engineering flows, pipe flow, similitude, compressible flows, and many engineering applications

GRADING

Homework - 15 sets	30%
Midterm quizzes (2)	30%
Final exam (May 12)	40%
TOTAL	100%

POLICY

There is no tolerance for academic misconduct. All assigned material is to be done independently except any group homework, if that should be assigned. Unless you have a good reason, no late assignment will be accepted, no makeup will be given. The exams will be closed book unless agreed otherwise.

TEXT BOOK

Munson, B., Okiishi, T., Huebsch, W., & Rothmayer, A. "Fundamentals of Fluid Mechanics", 7th Edition, John Wiley & Sons, 2013, ISBN: 978-1-118-11614-5 (Main Book)

REFERENCES (Bechtel Engineering Library Reserve)

1. Van Dyke, M. 1982, An Album of Fluid Motion. Parabolic. 14th Ed. ISBN-13: 978-0915760022
2. Visualized Flow, 1990, Japan Society of Mechanical Engineers, Pergammon Press.
3. Homsy, G. M. et al., Multi-Media Fluid Mechanics, CD-ROM, Cambridge Univ Press. 2nd Ed, 2008. SBN: 9780521721691
4. Student Companion Site of text book for additional resources:
http://bcs.wiley.com/he-bcs/Books?action=index&itemId=1118116135&bcsId=7240