Ö. Savaş
6113 Etcheverry Hall
Office Hours : MW 10:15-11:45

ME 106
Fluid Mechanics
Fall 2016

August 29, 2016
Lectures in LeConte 4
Lecture Hours MWF 9:10-10:00

COURSE

You are expected to be proficient in the fundamentals of mechanics (ME104) and thermodynamics (ME105). You are also expected to be prepared in mathematics inasmuch as it is needed for that proficiency (Math 54), and computer programming. Mathematically, you should be comfortable with vector calculus and ordinary differential equations. Computationally, you are expected to be proficient in a high level programming environment of your choice (e.g. Java, C/C++, Fortran, Mathematica, Matlab, IDL, GDL). We will cover the following topics: fluid properties, hydrostatics, conservation equations, analytic description of simple flows, flow measurement, empirical description of engineering flows, similitude, lift, drag, boundary layers, compressible flows, some engineering applications. **YOU ARE EXPECTED TO HAVE READ THE READING ASSIGNMENTS BEFORE THE LECTURES, INCLUDING LECTURE #1**

GRADING		LETTER GRADE BOUNDARIES	
Homework (9)	30%	A	85.0%
Midterm exams (Mondays, Oct 3, Nov 7)	40%	B	75.0%
Final exam (7-10pm, Thursday, Dec 15)	30%	C	65.0%
TOTAL	100%	D	55.0%

POLICY

We are all bound by the Berkeley Honor Code. All assigned material is to be done independently. Unless you have a good reason, no late assignment will be accepted, no makeup will be given. All exams will be *closed book*. You may bring your hand written notes and printed copies of any material posted on the course web site. You may also bring a calculator. No electronic communication is allowed. All results must be dimensionally correct. All numerical results must be presented in **SI UNITS**. It is your responsibility to *communicate* your work!

RECOMMENDED TEXT BOOK (either edition will do)

Munson, B. R., Young, D. F. & Okiishi, T. H., 2006 *Fundamentals of Fluid Mechanics*, 5th edition, Wiley.

Munson, B. R., Young, D. F., Okiishi, T. H. & Huebsch, W. W., 2009 *Fundamentals of Fluid Mechanics*, 6th edition, Wiley.

Munson, B. R., Okiishi, T. H., Huebsch, W. W. & Rothmayer, A. P. 2013 *Fundamentals of Fluid Mechanics*, 7th edition, Wiley.

REFERENCES

1. Çengel, Y. A. & Cimbala, J. M. 2006 *Fluid Mechanics*, McGraw-Hill.
2. Nakayama, Y. ed. 1988, *Visualized flow*, Japan Society of Mechanical Engineers. Pergamon Press.
3. Prandtl, L. & Tietjens, O. G. 1934 *Fundamentals of hydro- and aeromechanics* Dover.
4. Prandtl, L. & Tietjens, O. G. 1934 *Applied hydro- and aeromechanics.* Dover.
5. Samimy, M., Breuer, K. S., Leal, L. G. & Steen, P. H. 2003 *A Gallery of Fluid Motion.* Cambridge.
6. Tritton, D. J. 1988 *Physical fluid dynamics,* 2nd edition. Oxford.
7. Van Dyke, M. 1982 *An Album of Fluid Motion.* Parabolic.
8. White, F. M. 2008 *Fluid Mechanics*, 6th edition, McGraw-Hill.
9. `http://web.mit.edu/fluids/www/Shapiro/ncfmf.html`, National Committee for fluid Mechanics Films

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#	*date*		*Topic*	*Reading*	*Homework Due*
1.	Aug	24	Introduction	Ch. 1	
2.	Aug	26	Elementary Fluid Mechanics	Ch. 1	
3.	Aug	29	Elementary Fluid Mechanics	Ch. 2	
4.	Aug	31	Elementary Fluid Mechanics	Ch. 3	
5.	Sep	2	Elementary Fluid Mechanics	Ch. 3	
6.	Sep	7	Elementary Fluid Mechanics	Ch. 3	**HW 1**
7.	Sep	9	Fluid Kinematics	Ch. 4	
8.	Sep	12	Fluid Kinematics	Ch. 4	
9.	Sep	14	Fluid Kinematics	Ch. 4	**HW 2**
10.	Sep	19	Fluid Kinematics	Ch. 4	
11.	Sep	21	Integral Analysis	Ch. 5	
12.	Sep	23	Integral Analysis	Ch. 5	**HW 3**
13.	Sep	26	Integral Analysis	Ch. 5	
14.	Sep	28	Integral Analysis	Ch. 5	
15.	Sep	30	Integral Analysis	Ch. 5	**HW 4**
16.	Oct	3	*MIDTERM EXAM 1*		
17.	Oct	5	Differential Analysis	Ch. 6	
18.	Oct	7	Differential Analysis	Ch. 6	
19.	Oct	10	Differential Analysis	Ch. 6	
20.	Oct	12	Differential Analysis	Ch. 6	
21.	Oct	14	Differential Analysis	Ch. 6	**HW 5**
22.	Oct	17	Differential Analysis	Ch. 6	
23.	Oct	19	Differential Analysis	Ch. 7	
24.	Oct	21	Differential Analysis	Ch. 7	
25.	Oct	24	Dimensional Analysis, Similarity	Ch. 7	
26.	Oct	26	Dimensional Analysis, Similarity	Ch. 7	**HW 6**
27.	Oct	28	Channel Flow	Ch. 8	
28.	Oct	31	Channel Flow	Ch. 8	
29.	Nov	2	Channel Flow	Ch. 8	
30.	Nov	4	Open channel Flow	Ch. 8	
31.	Nov	7	*MIDTERM EXAM 2*		
32.	Nov	9	Lubrication Theory	Ch. 9	**HW 7**
33.	Nov	14	External Flow	Ch. 9	
34.	Nov	16	External Flow	Ch. 9	
35.	Nov	18	External Flow	Ch. 9	
36.	Nov	21	Matters of Lift & Drag		**HW 8**
37.	Nov	23	*Non-instructional day*		
38.	Nov	28	Compressible Flow	Ch. 11	
39.	Nov	30	Compressible Flow	Ch. 11	**HW 9**
40.	Dec	2	Compressible Flow	Ch. 11	
41.	Dec	5	*RRR Week*		
	Dec	9	*Classes End*		
	Dec	15	*FINAL EXAM*		Thursday 7:00-10:00pm
	Dec	16	*SEMESTER ENDS*		Friday

HW Problems

Use this table if you have the 5th edition Munson *et al*, 2006

HW	due	**SP**	Munson *et al* 2006, 5th ed.
HW 1	Sep 7	1	**Ch1:** 10, 41, 54, 65, 84; **Ch2:** 7, 61, 86, 97, 101
HW 2	Sep 14		**Ch3:** 8, 34, 77, 92
HW 3	Sep 23		**Ch4:** 2, 7, 15, 39, 50
HW 4	Sep 30	3	**Ch5:** 16, 20, 40, 69, 104
HW 5	Oct 14	4	**Ch6:** 4, 5, 8, 36, 39, 40
HW 6	Oct 26		**Ch6:** 75, 81, 93; **Ch7:** 11, 17, 64
HW 7	Nov 9		**Ch8:** 22, 86, 92, 110; **Ch10:** 3, 5, 78
HW 8	Nov 21	8, 9	
HW 9	Nov 30		**Ch9:** 12, 16, 17; **Ch11:** 9, 20, 31

Use this table if you have the 6th edition Munson *et al*, 2009

HW	due	**SP**	Munson *et al* 2009, 6th ed.
HW 1	Sep 7	1	**Ch1:** 11, 47, 60, 71, 97; **Ch2:** 7, 70, 102, 116, 120
HW 2	Sep 14		**Ch3:** 10, 25, 88, 101
HW 3	Sep 23		**Ch4:** 7, 12, 24, 43, 61
HW 4	Sep 30	3	**Ch5:** 20, 24, 60, 76, 129
HW 5	Oct 14	4	**Ch6:** 4, 6, 9, 41, 44, 45
HW 6	Oct 26		**Ch6:** 85, 93, 105; **Ch7:** 19, 21, 65
HW 7	Nov 9		**Ch8:** 28, 86, 90, 122; **Ch10:** 5, 7, 90
HW 8	Nov 21	8, 9	
HW 9	Nov 30		**Ch9:** 15, 21, 22; **Ch11:** 11, 16, 36

Use this table if you have the 7th edition Munson *et al*, 2013

HW	due	**SP**	Munson *et al* 2013, 7th ed.
HW 1	Sep 7	1	**Ch1:** 15, 58, 75, 89, 124; **Ch2:** 10, 99, 140, 156, 162
HW 2	Sep 14		**Ch3:** 8, 24, 95, 112
HW 3	Sep 23		**Ch4:** 6, 11, 21, 46, 63
HW 4	Sep 30	3	**Ch5:** 22, 25, 70, 88, 133
HW 5	Oct 14	4	**Ch6:** 4, 6, 9, 41, 44, 46
HW 6	Oct 26		**Ch6:** 88, 95, 108; **Ch7:** 19, 21, 77
HW 7	Nov 9		**Ch8:** 25, 84, 88, 125; **Ch10:** 4, 7, 97
HW 8	Nov 21	8, 9	
HW 9	Nov 30		**Ch9:** 15, 21, 22; **Ch11:** 12, 16, 33

In PROGRESS Use this table if you have the 8th edition Munson *et al*, 2016

HW	due	**SP**	Munson *et al* 2015, 8th ed.
HW 1	Sep 7	1	**Ch1:** 15, 57, 73, 89, 124; **Ch2:** 10, 106, 140, 156, 162
HW 2	Sep 23		**Ch3:** 8, 25, 102, 123
HW 3	Sep 30		**Ch4:** 6, 11, 23, 46, 63
HW 4	Feb 25	3	**Ch5:** 21, 25, 66, 83, 125
HW 5	Oct 14	4	**Ch6:** 4, 5, 8, 32, 35, 36
HW 6	Oct 26		**Ch6:** 72, 80, 96; **Ch7:** 15, 16, 66
HW 7	Nov 9		**Ch8:** 21, 78, 83, 131; **Ch10:** 3, 5, 77
HW 8	Nov 21	8, 9	
HW 9	Nov 30		**Ch9:** 16, 20, 21; **Ch11:** 7, 16, 43