

MTH 444/544 Fundamentals of Applied Mathematics II Spring 2006

Times, place: TuTh 11:00am-12:20pm, 250 Math Bldg

Instructor: John Ringland.
Office: 206 Mathematics Building.
Office hours: _____, and by appointment.
Phone: 645-6284 ext 147.

E-mail: Mine: ringland@math.buffalo.edu .
Yours: I will assume the address for you I get from MyUB is correct.
**At your earliest opportunity, e-mail me an alias I can use for posting your grades.
It must not be your real name or an abbreviation of it.**

Website: orange.math.buffalo.edu/444/ Bookmark it!
You are expected to keep an eye on the website, checking at least several times each week.

Textbooks: Coursepack from Great Lakes Printing and Graphics in UB Commons,
comprising excerpts from 4 books: See details on next page.

Syllabus: On next page.

Grades:

Homework:	25%.
In-class Test#1, Tu, February 14:	25%
In-class Test#2, Th, March 23:	25%.
In-class Test#3, Th, April 27:	25%.

Homework: Homework will be assigned at regular intervals. It will always be due at the beginning of a class period. *No late homework will be accepted.* Solutions will be posted on the website. In the computation of the final grade, the lowest homework score will be dropped.

Prescription for success: Sustained steady effort: starting today! Make full use of the human resources available to you: me (in class, during office hours, and by appointment), and your fellow students! Start homework assignments early! Get a study-group together!

Maple: We will use Maple extensively: to visualize some results, and to speed up and check tedious computations,. This software is installed in the classroom and in all the CIT public sites. You can buy a 1-year license for Maple (for Linux, Mac, or Windows) for a nominal charge at UBMicro, and I recommend you do this if you haven't already.

Maple guide: [A guide to the use of Maple in this course is available on the course website.](#)

Bail-out dates: I hope these will not be relevant to you, but just in case:
Friday, Jan 23 is the last day to drop the class with no record on your transcript,
Friday, March 5 is the last day to resign from the course (with an R on your transcript).

Students with disabilities: If you have a diagnosed disability (physical, learning or psychological) which will make it difficult for you to carry out the course work as outlined, or requires accommodations such as recruiting note-takers, readers, or extended time on exams and/or assignments, please advise me during the first two weeks of class so we may review possible arrangements for reasonable accommodations.

Coursepack for MTH 444/544, Spring 2004

Chorin and Marsden, *A Mathematical Introduction to Fluid Mechanics*, 3rd ed., Springer,

Title Page

pp 1-46

pp 163-164

Landau and Lifschitz, *Fluid Mechanics*, Pergamon,

Title Page

p v (TOC)

pp 1-59

pp 245-259

Lin & Segel, *Mathematics Applied to Deterministic Problems in the Natural Sciences*, SIAM,

Title Page

pp xviii-xx (TOC)

pp 412-470

pp 505-560

pp 605-609 (index)

Segel, *Mathematics Applied to Continuum Mechanics*, Dover,

Title Page

pp xi-xiv (TOC)

pp 1-173

pp 193-219

pp 259-264

pp 278-285

pp 586-590 (index)

Provisional Schedule:

1	0.5	Fluids: conservation of mass	Chorin & Marsden	1.1	
1.5	0.5	Ideal fluids: momentum balance	Chorin & Marsden	1.1	
2	1	Transport theorem	Lin & Segel		
3	0.63	Hydrostatics	Lin & Segel	15.1	
3.63	0.19	Surface profile in spinning bucket	Analysis and experiment		
3.81	0.5	Gravity waves in deep water	Landau & Lifschitz	12	
4.31	0.5	Dispersion, group velocity	Landau & Lifschitz	12	
4.81	1	Waves on water: dispersion	Experiment & analysis		
5.81	1	Gravity waves in shallow channel	Landau & Lifschitz	13	
6.81	0.3	Water waves in a gutter	Experiment		
7.11	1	Stability of a stratified fluid	Lin & Segel	15.2	
8.11	1	Waves whipped up on water	Lin & Segel	15.2	Prob. 15.2.8
9.11	1	Sound	Lin & Segel	15.3	
10.11	1	Potential flow: flow past a cylinder	Lin & Segel	15.4	
11.11	2	Tensors	Segel	1	
13.11	1	Viscous fluid flow: Navier-Stokes eqns	Segel	3.1	
14.11	0.5	Plane couette flow	Segel	3.2	
14.61	0.5	Plane and pipe poiseuille flow	Segel	3.2	
15.11	0.75	Blowing through straws	Experiment		
15.86	1	Rayleigh impulsive flow	Segel	3.2	
16.86	1	Spin-up time in bucket	Experiment & analysis		
17.86	0.13	Hot and cold water slosh decay	Experiment & analysis		
17.99	1	Boundary layers and separation	Segel	3.3-3.4	
18.99	1	Elastic solids	Segel	4.1	
19.99	1	Hooke's law, elastic moduli	Segel	4.2	
20.99	0.25	Jello elastic constants?	Experiment		
21.24	1	Navier's equations	Segel	4.3	
22.24		Beltrami-Michell equations	Segel	4.3	
22.24	1	Bending of beams	Segel	5.1	
23.24	1	Elastic waves in unbounded media	Segel	6.1	
24.24		P&S waves	Segel	6.1	
24.24	1	Sound of a metal bar	Experiment & analysis		
25.24	1	Waves on ice sheet on water (project?)	Experiment & analysis		
26.24	1	Motion of a flexible string: hanging chain	Analysis and experiment	[Antman]	