ME 520, Section A1

Acoustics I

FALL 2013 INFO SHEET

CLASS: T-Th 10-12, ENG 202:

TEXT: Fundamentals of Physical Acoustics, Blackstock, 1st edition, Wiley, 2000, ISBN 9780471319795

PROFESSOR: Glynn Holt rgholt@bu
110 Cummington, Rm 417 353-9594 office
Office hours T, 2-4:00, or by appointment

GRADING:

35%	(Homework)
35%	(Quizams)
30%	Final Exam

HOMEWORK: Homework assignments are given out weekly with a few exceptions. They are due at the BEGINNING of class on the due date listed. LATE HOMEWORK WILL NOT BE ACCEPTED unless circumstances merit the exception.

EXAMS: Over the course of the semester, I will give several "quizams": more than a quiz, less than an exam. The goal is to have you keep up and immersed in the subject, rather than have spasmodic cramming. I will give a comprehensive final exam that will likely be a take-home exam due when the final is scheduled. "Make-up" exams will rarely be given, and never in the case of prior knowledge of a time conflict (you must arrange to take the test before you are away). A "make-up" quiz will be different from the quiz given in the class, and may be oral.

DO NOT UNDER ANY CIRCUMSTANCE SCHEDULE TRIPS OR FLIGHTS HOME UNTIL AFTER THE OFFICIAL UNIVERSITY EXAM PERIOD.

DROP DATES: Pay attention to the University's schedule of drop dates. You cannot drop this course after the last "W" date because of an impending low grade – you will receive your current grade if you drop after the official W date. "Incomplete" grades are reserved for the most extreme of circumstances, and are a NEGOTIATED CONTRACT between the student and myself.

PREREQUISITES: ENGME302, ENGME303, ENGME304 & ENGME400, or consent of instructor. You need dynamics, fluids, thermodynamics, complex variables and PDE's.

COLLABORATION: Homework: Homework is the only collaborative activity in ME520. That being said, you must do your own work, and turn in your own work. However, you are encouraged to consult and collaborate with classmates on general concepts and even specific approaches. (I believe recent research refers to this unfortunately as "horizontal learning" – I prefer "peer-to-peer learning").

Exams and quizzes: Done individually.

ME520, Section A1, FALL 2013 Syllabus by class

Class	DATES	LECTURE TOPIC	HOMEWORK
1	9/3	Introduction and admin; Chapter 1:1.A what's a wave?; 1.B wave equation, general solutions	HW1 (1.B-1.C) assigned: Sec 1.B: 1, 2, 4 Sec 1.C: 3, 5, 6, 8
2	9/5	Chapter 1; 1.B: general solutions, travelling waves; characteristics; plane travelling waves; initial condition and forced solution methods; 1.C: Derivation of the wave equation (Electrical and string)	
3	9/10	Chapter 1; 1.C. Derive the fluid acoustic wave equation; characteristic (specific) impedance	
4	9/12	Chapter 1; 1.C. finish plane wave impedance; 1.D. vector (1D) Euler equation; introduce and derive wave equation for velocity potential; spherical and cylindrical coords (radial only); spherical spreading	HW1 due; HW2 (1.D-1.E) assigned: Sec 1.D: 2 Sec 1.E: 1, 4, 5, 6, 7
5	9/17	Chapter 1; 1.D. pulsating sphere example, complex p, u, Z. 1.E. signals, levels, impedance, intensity and power	
6	9/19	Chapter 3; 3.A – 3.B: Reflection and Transmission at plane interface	HW2 due;
7	9/24	Quizam 1 (Chapter 1)	HW3 (3.A- 3.D) assigned: 3.1, 3.3, 3.6,3.7, 3.9, 3.11, 3.12
8	9/26	Chapter 3; Finish 3.B, rigid and pressure release; 3.C – 3.D: Examples of reflection/transmission	
9	10/1	Finish 3.D with bursting balloon and converging spherical shock example;	
10	10/3	Chapter 4; 4.A - 4.B.1 (complex) Termination, single impedance termination, pressure release	HW3 due;
11	10/8	Quizam 2 (Chapter 3)1.5 hours; no lecture	HW4 (4.A) assigned: velocity source pressure release problem;
12	10/10	Chapter 4; 4.B.1 derive U, 4.B.2-4 –	HW4 4B: calculate Zn

		4.F: impedance tube demo	for all cases measured in class impedance tube demo
	10/17	Chapter 4; 4.C lumped elements: 4.C.1- 4.C.3	HW4 4B assigned: 4.B.3, 4.B.6, 4.B.12, 4.B.14
13	10/22	Quizam 3 (Chapter 4A&B only); no lecture	HW4 due; HW5 (4C) assigned: 4.C.1, 4.C.4, 4.C.5, 4.C.7
14	10/24	Chapter 4; 4.C lumped elements: 4.C.4- 4.C.6	
15	10/29	Chapter 4; 4.D.1 side branch, filter; 4.D.2 probe tip mic; 4.E.1 Examples, three-medium problem, constant S	HW 5 (4C) due; HW6 (4D-4E) assigned: 4.D.2, 4.D.4, 4.E.1, 4.E.8
16	10/31	Chapter 4; 4.F lumped wall; 4.E.2 varying cross-section Chapter 5; 5.A oblique; 5.B.1 2-fluid plane wave	
17	11/5	Chapter 5; 5.B.2 perfect T, TIR, grazing incidence	HW6 due; HW7 (CH5) assigned: 5.2, 5.5, 5.12, 5.19
18	11/7	Quizam 4 (Chapter 4.C thru 4.E)	
19	11/12	Chapter 5; TIR comments; 5.C elastic panel; 5.D composite wall	
20	11/14	Chapter 6; <SKIP 6.A, 6.B,> 6.C normal modes, Cartesian, cubic cell example	HW7 due
21	11/19	TBD	
22	11/21	TBD	
23	11/26	Acoustic levitation, demo in rectangular cell	
24	12/3	Chapter 6; 6.D.1 – 6.D.4, rectangular waveguide	HW8 (CH 6) assigned: 6.3, 6.9, 6.12
25	12/5	Chapter 7; 7.A Webster; 7.B Exponential horn; 7.C impedance, transmission, etc	
26	12/10	Chapter 8; 8A static properties atmosphere and ocean; 8B vertical propagation; 8C horizontal propagation and ray theory	HW8 due
		FINAL: Take-home final, 1 week beginning last day of class	
		IF we get ahead, Chapter 9.	