ME 520, Section A1

Acoustics I

FALL 2019 INFO SHEET

CLASS: T-Th 1:30 – 3:15, CAS 204B :

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 3:30 – 5:30

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 viva.

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 & ENGME566, their equivalent 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", or for those of you over 21, "beer-to-beer learning").

Exams and quizzes: Done individually.

ME520, Section A1, FALL 2019 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:
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	
5	9/17	Chapter 1; 1.D. pulsating sphere example, complex p, u, Z. 1.E. signals, levels, impedance, intensity and power	HW1 due; HW2 (1.D-1.E) assigned:
	9/19	NO CLASS	
6	9/24	Chapter 3; 3.A – 3.B: Reflection and Transmission at plane interface	
7	9/26	Chapter 3; Finish 3.B, rigid and pressure release; 3.C – 3.D: Examples of reflection/transmission	HW2 due;
8	10/1	Quizam 1 (Chapter 1)	HW3 (3.A- 3.D) assigned:
9	10/3	Finish 3.D with bursting balloon and converging spherical shock example;	
10	10/8	Chapter 4; 4.A - 4.B.1 (complex) Termination, single impedance termination, pressure release	
11	10/10	Chapter 4; 4.B.1 derive U, 4.B.2-4 – 4.F:	HW3 due;
	10/15	NO CLASS MONDAY SCHEDULE	
12	10/17	Quizam 2 (Chapter 3)1.5 hours;	HW4 (4.A) assigned: HW4 4B assigned:
13	10/22	impedance tube lab	HW4 4B: imp tube

14	10/24	Chapter 4; 4.C lumped elements: 4.C.1- 4.C.3	
15	10/29	Chapter 4; 4.C lumped elements: 4.C.4- 4.C.5 – Helmholtz demo	HW4 due; HW5 (4C) assigned:
16	10/31	Quizam 3 (Chapter 4A&B only); no lecture Chapter 4;	
17	11/5	4.c.6, 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:
18	11/7	Chapter 4; 4.F lumped wall; 4.E.2 varying cross-section	
19	11/12	Chapter 5; 5.A oblique; 5.B.1 2-fluid plane wave; 5.B.2, perfect T, TIR, grazing incidence; FTIR	HW6 due;
20	11/14	Quizam 4 (Chapter 4.C thru 4.E)	HW7 (CH5) assigned:
21	11/19	Chapter 6; <SKIP 6.A, 6.B,> 6.C normal modes, Cartesian, cubic cell example	
22	11/21	Acoustic levitation, demo	HW7 due; HW8 (CH 6) assigned:
23	11/26	Chapter 6; 6.D.1 – 6.D.4, rectangular waveguide	
	11/28	No Class THANKSGIVING BREAK	
24	12/3	Chapter 7; 7.A Webster; 7.B Exponential horn; 7.C impedance, transmission, etc	HW8 due
25	12/5	Chapter 8; 8A static properties atmosphere and ocean; 8B vertical propagation; 8C horizontal propagation, ray theory, Pekeris wave guide	
26	12/10	Selected Topic 1	FINAL DAY OF CLASSES
27	Dec 16-20 (TBD)	FINAL EXAM	