



**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 2014 Syllabus by class**

Class	DATES	LECTURE TOPIC	HOMEWORK
1	9/2	Introduction and admin; Chapter 1:1.A what's a wave?; 1.B wave equation, general solutions	HW1 (1.B-1.C) assigned:
	9/4	No Class	
2	9/9	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	9/11	Chapter 1; 1.C. Derive the fluid acoustic wave equation; characteristic (specific) impedance	
4	9/16	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	9/18	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:
6	9/23	Chapter 3; 3.A – 3.B: Reflection and Transmission at plane interface	
7	9/25	Chapter 3; Finish 3.B, rigid and pressure release;	HW2 due;
8	9/26	Quizam 1 (Chapter 1)	HW3 (3.A- 3.D) assigned:
9	9/30	3.C – 3.D: Examples of reflection/transmission	
10	10/2	Finish 3.D with bursting balloon and converging spherical shock example;	
11	10/7	Chapter 4; 4.A - 4.B.1 (complex) Termination, single impedance termination, pressure release	HW3 due; HW4 (4.A) assigned:
12	10/9	Quizam 2 (Chapter 3)1.5 hours; no lecture	
	10/14	No Class (MondaySchedule)	
13	10/16	Chapter 4; 4.B.1 derive $U$ , 4.B.2-4 – 4.F:	HW4 4B assigned:
14	10/21	impedance tube demo	HW4 4B:

15	10/23	Chapter 4; 4.C lumped elements: 4.C.1- 4.C.3	
16	10/28	Chapter 4; 4.C lumped elements: 4.C.4- 4.C.5 – Helmholtz demo	HW4 due; HW5 (4C) assigned:
17	10/30	Quizam 3 (Chapter 4A&B only); no lecture Chapter 4;	
18	11/4	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:
19	11/11	Chapter 4; 4.F lumped wall; 4.E.2 varying cross-section	
20	11/13	Chapter 5; 5.A oblique; 5.B.1 2-fluid plane wave; 5.B.2, perfect T, TIR, grazing incidence; FTIR	HW6 due;
21	11/18	Quizam 4 (Chapter 4.C thru 4.E)	
22	11/20	Chapter 6; <SKIP 6.A, 6.B,> 6.C normal modes, Cartesian, cubic cell example	HW7 (CH5) assigned:
23	11/25	Acoustic levitation, demo in rectangular cell	HW7 due; HW8 (CH 6) assigned:
	11/27	No Class (Thanksgiving)	
24	12/2	Chapter 6; 6.D.1 – 6.D.4, rectangular waveguide	
25	12/4	Chapter 7; 7.A Webster; 7.B Exponential horn; 7.C impedance, transmission, etc	HW8 due
27	12/9	Chapter 8; 8A static properties atmosphere and ocean; 8B vertical propagation; 8C horizontal propagation and ray theory	
		FINAL: Take-home final, 1 week beginning last day of class	