

Physics 605 Syllabus

1/22/2013

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Office: 2018 NCPA MWF 10:30 -11:00, 1:00-3:00 or by calling 915-5888 for an appointment. TTH 1:00 – 3:00

I also am glad to answer questions by e-mail.

Text: *Acoustics, An Introduction to its Physical Principles and Applications*, by Allan D. Pierce, published by the Acoustical Society of America

Grading:

3	Tests
2	Homework average
<u>2</u>	<u>Final</u>
7	

100-87.5	A
87.5-75	B
75-62.5	C
62.5-50	D
<50	F

Academic Regulations:

Regular attendance is expected. Every class is important. Please do not come late. Homework is to be turned in at the beginning of class.

Web site for correct time:

<http://nist.time.gov/timezone.cgi?Central/d/-6>

Advance Acoustics Goals: to develop a deep understanding of the physical processes of acoustic theory.

This class emphasizes processes unique to acoustics. Overlapping fields such as modes in enclosures, diffraction and refraction are not covered.

We cover Chapters 1, 3, 10 and 11 with supplementary materials from the literature. Familiarity with the material in Chapter 2 is advised

Key concepts:

Chapter 1: Acoustic propagation in fluids, adiabatic versus isothermal, velocity potential

Chapter 3: Boundary conditions, resonance, trace velocity matching principle, impedance translation, waves in tubes, ground impedance, spherical wave reflection.

Chapter 10: Losses due to thermal and viscous effects, molecular relaxation

Chapter 11: Finite amplitude wave, shock analysis

Expectations:

You are expected to read the text material before class and after class. It is expected that you will be able to reproduce any derivation presented on tests and the exam. I highly recommend that you take notes in class and annotate or recopy these notes after class so that you can use these notes to study. The problems in this course are similar to and often derived from research problems. Solving these will develop your ability to do independent research. Some of the homework problems are difficult. You should start working on the problems early so that if you need to read other texts or go to the library you will have time to do so. The text contains references to key papers in physical acoustics. It is good practice to look these references up to gain further insight into the material and to the historical development of the field.

The syllabus below is subject to change to accommodate instruction and/or student needs.

Date	Chapter	Homework Due
Jan 22	Sec 1.1, 1.2, 1.3, 1.4	
Jan 24	Sec 1.4, 1.5, 1.6, 1.7	
Jan 29	Sec 1.7, 1.8	
Jan 31	Sec 1.9, 1.10	
Feb 5	Sec 1.10, 1.11	
Feb 7	Sec 1.12, 3.1, 3.2, 3.3	Ch1 set 1 problems due
Feb 12	Sec 3.4	
Feb 14	Sec 3.5, 3.6	Ch1 set 2 problems due
Feb 19	Sec 3.6, 3.7, homework discussion	
Feb 21	Test 1, Chapter 1	
Feb 26	Sec 3.7, Viscosity (Reif), 10.1 + Batchelor	
Feb 28	Sec 10.2, 10.3	
Mar 5	Sec 10.3	
Mar 7	Sec 10.3, 10.4	Ch3 set 1 problems due
Mar 11-15	Spring break	
Mar 19	Propagation in tubes (Tijdeman)	
Mar 21	Propagation in tubes (Tijdeman)	Ch3 set 2 problems due
Mar 26	Test and HW discussion	
Mar 28	Test 2, Chapter 1, 3	
Apr 2	Ground impedance models	
Apr 4	Ground impedance, Spherical wave reflection	
Apr 9	Spherical wave reflection	
Apr 11	10.7, 10.8	Ch10 set 1 problems due
Apr 18	Non-linear Acoustics (Hamilton and Blackstock)	
Apr 23	Sec 11.1, 11.2, 11.3	Ch10 set 2 problems due
Apr 25	Sec 11.3, 11.4, HW discussion	
Apr 30	Test 3, Chapters 1, 3, 10	
May 2	Test discussion, 11.9	
May 9	Final Exam 8:00	