# Physics 605
# Syllabus

# 1/15/2007

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**Offices:** 2018 NCPA MWF 9:45 -11:00, 2:00-3:00 or by calling 915-5888 for an appointment. TTH 10:30 – 11:00, 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 |
| 2 | Final |
| 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.

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 17 | Sec 1.1, 1.2, 1.3 | |
| Jan 19 | Sec 1.4, 1.5 | |
| Jan 22 | Sec 1.6,1.7 | |
| Jan 24 | Sec 1.7, 1.8 | |
| Jan 26 | Sec 1.8, 1.9 | |
| Jan 29 | Sec 1.9, 1.10 | |
| Jan 31 | Sec 1.10, 1.11 | |
| Feb 2 | Sec 1.11, 1.12 | **Ch1 set 1 problems due** |
| Feb 5 | Sec 3.1, 3.2 | |
| Feb 7 | Sec 3.2, 3.3 | |
| Feb 9 | Sec 3.3 | |
| Feb 12 | Sec 3.4 | **Ch1 set 2 problems due** |
| Feb 14 | Sec 3.4 | |
| **Feb 16** | **Test 1, Chapter 1 (Utah trip)** | |
| Feb 19 | Sec 3.4, 3.5 | |
| Feb 21 | Sec 3.5 | |
| Feb 23 | (MAS - no class) | |
| Feb 26 | Sec 3.5 | |
| Feb 28 | Sec 3.6 | |
| Mar 2 | Sec 3.7 | |
| Mar 5 | Viscosity (Reif) | **Ch3 set 1 problems due** |
| Mar 7 | Sec 10.1 + Batchelor | |
| Mar 9 | Sec 10.1, 10.2 | |
| Mar 12, 14, 16 | Spring break | |
| Mar 19 | Sec 10.3, 10.3 | **Ch3 set 2 problems due** |
| Mar 21 | Sec 10.3 | |
| Mar 23 | Sec 10.4 | |
| **Mar 26** | **Test 2, Chapter 1, 3** | |
| Mar 28 | Sec 10.4 | |
| Mar 30 | Propagation in tubes (Tijdeman) | |
| Apr 2 | Propagation in tubes (Tijdeman) | **Ch10 set 1 problems due** |
| Apr 4 | Propagation in tubes (Tijdeman) | |
| Apr 6 | Sec 10.7 | |
| Apr 9 | Sec 10.8 | |
| Apr 11 | Good Friday, no class | |
| Apr 13 | Sec 10.8 | |
| Apr 16 | Sec 10.9 | |
| Apr 18 | Non-linear Acoustics (Hamilton and Blackstock) | |
| Apr 20 | Sec 11.1, 11.2 | |
| Apr 23 | Sec 11.3 | **Ch10 set 2 problems due** |
| Apr 25 | Sec 11.3 | |
| Apr 27 | **Test 3, Chapter 1, 3, 10** | |
| Apr 30 | Sec 11.4 | |
| May 2 | Review | |
| May 4 | Review | **Ch 11 problems due** |
| May 7-11 | Final Exams | |